POPULAR AVIATION

A Magazine for the Promotion of Amateur Aviation and Private Flying

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Feeding the Favorites!

by WALTER W. LIGGETT

The True Aviation Conditions in Official Washington *UNMASKED*

Editor's Note.—Mr. Liggett is a special investigator sent to Washington, D. C., by POPULAR AVIATION. Further disclosures from his pen will appear in succeeding issues.

WITH the world in a turmoil, and with at least one rival nation jealously regarding us, the congressmen of the United States find that the Army Air Corps has no definite policy! The sum total of our class "A" military airplanes, suitable for service, numbers only 208!

Responsible officials calmly admit, that in the event of another war, we might have to buy our engines abroad, so that our pilots can battle on equal terms with enemy airmen. This situation should arouse the burning indignation of every true and patriotic American.

All of these facts were brought out into the daylight by highly placed army officers who testified—in executive session—before a sub-committee of the House Committee on Appropriations. All statements concerning the insufficiency of our military air program—mentioned many times editorially by POPULAR AVIATION—were frankly admitted.

It is known that the Army spent $22,576,835.36 for planes, engines, accessories and equipment during the fiscal year of 1931, and then spent more than $50,000,000 in addition for payrolls, landing fields, maintenance and experimentation. And now we have just 208 Class "A" fighting airplanes to show for this tremendous expenditure. More than a billion dollars have been spent since 1920 to place the United States in the first rank as a world air power, but now we find to our chagrin that we actually stand between fourth and fifth place among other major nations.

Such conditions, therefore, savor of rank profiteering and after due investigation it has been found that such profiteering does exist—just as predicted. A few large corporations, backed by well known financiers and banking houses, get the cream of the business at the expense of other firms and individuals not inside the enchanted ring. This is a drag—an almost unsurmountable burden upon the shoulders of legitimate aviation—and a positive detriment to our national defense.

POPULAR AVIATION has commissioned me to collect the facts and it will print them—as a patriotic duty—because these facts concern the safety of every American citizen and the welfare of our country. Indifference, incompetency, jealousy, greed and downright dishonesty of purpose, if allowed to continue, will spell the ruin of the United States unless assistance is rendered to the small group of patriots who stand in vigorous and outspoken protest.

Disclosures made before the House Appropriations Committee, and the astonishing state of affairs revealed by this committee hearing, have again impressed not a few members of Congress with the imperative necessity of investigating the glaring mis-administration of the millions which the government has generously appropriated for the purpose of assisting the industry.

These disclosures have also given increased impetus to the movement to abolish the separate Army and Navy departments, and to create a new Department of National Defense in which the Air Service will be placed on an independent footing. It will then stand a chance of being developed by its friends, instead, as is now the case, of being deliberately handicapped by the "brass hats" in the Army and Navy Staffs.

A COMMUNICATION FROM THE AUTHOR

Before going to press, POPULAR AVIATION submitted the final proofs of this article to Mr. Liggett for his final O. K. With the returned proofs, the following extraordinary letter was received:

Long Island, N. Y.
March 19, 1932.

Popular Aviation,
Chicago, Ill.
"Dear Editor:

"I am rushing back proofs of article with one or two slight changes. . . .

"Although your package was sent to me special delivery first class mail, it did not arrive until 8:30 this morning—or just exactly 48 hours after it was mailed in Chicago. It also bore unmistakable evidence of having been opened enroute, and this was alibied by the stamped notice, 'Received in damaged condition at the Chicago, Ill., Post Office'.

"This doesn't excite me any—it isn't the first time my mail has been tampered with—but it occurred to me that you should know this. Under separate cover I am enclosing your original envelope so that you can examine it and see for yourself that it was opened. . . .

Sincerely,
(Signed) WALTER W. LIGGETT."

GENERAL BENJAMIN D. FOULOIS, chief of the Army Air Corps, was cross-examined closely by members of the House Committee. He admitted that "the Army Air Corps would not have a well balanced and properly equipped air force, even if the five year program had been completed—but it was not completed."

"What would you say, generally, of the state of our air preparedness right now?" asked Representative Henry E. Barbour of California at the investigation.

"Comparatively speaking, I would say that we would be about fourth or fifth in proportion to numbers, using the proportion of combat planes that we have in comparison with other nations," General Foulois replied.

Congressman Ross Collins, Mississippi, chairman of the sub-committee and a consistent advocate of better aviation preparedness, then asked General Foulois how many pursuit, bombing and attack planes were in the Army Air Service. General Foulois said his report showed 209 pursuit planes, 86 bombers and 106 attack planes.

"How many of these fighting planes are grade 'A' planes and how many are classified as grade 'B' planes?" Congressman Collins persisted.

"We have 95 class 'A' pursuit planes, 63 bombardment planes and 50 class 'A' attack planes," General Foulois replied.

"Then all together, you have less than 210 first class fighting planes now in commission?" Congressman Collins asked. General Foulois agreed that this was a fact.

"Why is the actual number of planes on hand in the Army Air Service top-heavy with observation, utility, photographic, training and transport planes," Congressman Ross continued, "and why have we so few fighting planes, especially in view of the fact that fighting planes, except bombardment planes, are very much less expensive than the other types?"

General Foulois replied that, "during the war we found the first things we had to take care of was the requirements for direct operation with the ground army. That is, observation."

"IS IT the present policy of the War Department to make the Air Corps merely an auxiliary of the ground forces?" Congressman Collins demanded.

"I really do not know," General Foulois said. "I have been endeavoring for several years to have a more definite policy as to the proper role of the Air Corps in the scheme of national defense. I do not know definitely what

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FEEDING THE FAVORITES

Drawn by Herman R. Bollin

our policy is or where our place is at the present time in the scheme of national defense."

"In other words, *there is no policy*," Congressman Collins pressed.

"I believe you are right about that," General Foulois admitted.

This astonishing admission, by the chief of the Army Air Corps, that he did not know the exact role that our aviation arm of defense was expected to play in case of a sudden emergency, almost dumbfounded several of the congressmen. But there were other disclosures almost as amazing.

General Foulois, under pressure, said that most of the Army Air Corps pursuit planes could not average more than 142 miles per hour, and that they were outdistanced by the bombardment planes that they were supposed to protect.

"ISN'T it a fact," Congressman Collins asked, "that we have no engine in the United States that is comparable to the Rolls-Royce or to other well known foreign engines?"

"No, we have not had it so far," General Foulois conceded, "but the development is going on now."

"The development may be going on," Congressman Collins rejoined, "but we are playing around with the industry. Our air force cannot be better than the planes at the disposal or the engines in the planes, and if we do not develop a better engine or a faster plane, don't you think as a matter of good national defense, it is the duty of this committee to recommend that you buy planes abroad?"

"Well, if we cannot develop a better engine or faster planes, yes sir," General Foulois said. Later, under sustained cross-questioning, General Foulois stated that he thought the national defense act "is about due to be rewritten."

[*EDITOR'S NOTE. It is very evident that the favorite corporations that are supplying these engines to the government, don't amount to much in the engineering way if their engineers can't compete with the European engines of today. It might be a good thing for the officials to take a good look at industrial America and assist independent manufacturers outside the "charmed circle" before they start ordering engines and ships from Europe.*]

The hearing, held by the sub-committee of Chairman Collins, brought out many facts which had been kept carefully under cover. Heretofore, general staff officers and other functionaries of the War and Navy Departments have attended all of these meetings. Often, whispered consultations followed the questions put to these officers by the Congressmen, and more than once high officials corrected statements made by subordinates.

This year, Chairman Collins advised the War Department that he felt he could conduct the hearing without its help. Consequently, the witnesses seemed freer to speak their minds, and a frankness was displayed which had been noticeably lacking in former hearings.

Reports submitted by General Foulois revealed that the Army Service, while it is short of the number of pursuit, attack and bombardment planes authorized by the 5-year program which Congress and the military heads laid down in 1927, actually has 400 observation planes—more than the quota provided by the program. The standard observation plane, with equipment, costs between $35,000 and $70,000 apiece—more than double the cost of pursuit or attack planes. And the overstressing of observation planes clearly proves that the Army General Staff had in mind that the Air Corps, in the event of another war, shall from the first be subordinated to the ground forces.

General Benj. D. Foulois

THE new chief of the U. S. Army Air Corps, General Benjamin D. Foulois, who recently succeeded General Fechet, is one of the old timers in aviation and has a remarkable record.

He was one of the first officers in our military air service, being assigned to receive instructions from the Wright brothers in July, 1909. Owing to a time limit, then placed on special details, he was ordered back to San Antonio, Texas, with his regiment before completing the course of instruction. He then taught himself to fly the Wright machine.

During the Mexican outbreak, early in 1911, the army had no airplanes (as usual) to send to the Mexican border, so the only available ship was a Wright biplane loaned to the government by Mr. Robert J. Collier. On this machine, Foulois and Parmalee made many scouting flights along the border.

General Foulois was one of the first ten officers to receive an F. A. I. pilot's certificate.

When the Mexican bandit, Villa, raided Columbus, New Mexico, in March, 1916, General (then Captain) Foulois was stationed at Fort Sam Houston, Texas. He joined General Pershing with a wholly inadequate aero squadron.

Thus, we see that General Foulois has had about 23 years' active experience in aeronautics, not as an office man, but as an actual aviator for much of this time.

General Foulois cannot fairly be held responsible for conditions as he inherited them; he can, however, be judged upon his activities in correcting the present deplorable situation.

GENERAL FOULOIS admitted that the recent order of the Adjutant General, placing the Air Corps under the commanders of the various corps areas, clearly indicated a tendency toward making the Air Corps merely an auxiliary of the ground forces.

General Foulois also told the committee, that recently, the Air Corps made a study of all the commercial planes in the United States from the standpoint of "being useful to us in an emergency, and of that entire number there were only 72 planes that we could use for combat work.

"The great mass of commercial planes, except for transport, are of not much military value. . . . Practically every type of commercial plane would have to be redesigned for military purposes. . . .

"At the outbreak of the last war, we had no aviation industry. . . . Our mobilization plans at the present time show there is not aviation industry in the country to meet our needs except after a period of from six to nine months. . . . There is no comparison, however, with 1917. We are much better prepared now than any time since the end of the World War."

Assistant Secretary of War F. Trubee Davidson, in his testimony, after admitting that the present equipment of the Air Corps fell far short in both the personnel and materiel contemplated by the 5-year program, inferred that this was brought about by the parsimony of Congress. This insinuation was promptly refuted by several congressmen.

"Since I have been a member of this committee," said Congressman Barbour of California, "every representative of the Air Corps, from General Mitchell to the present time, has stated that sufficient funds were being appropriated for aviation to give an adequate air force. Last year, our total appropriations for aviation were $163,000,000. Now, if we are in a state of inadequate preparedness, it would seem that *it is the fault of the War Department and not Congress.*"

It was shown that since 1927, when the 5-year program went into effect, the appropriations for the Army, Navy, Coast Guard, Post Office, the Department of Commerce and Agricultural Department air service have totaled $647,545,773. In the fiscal year of 1932 the governmental appropriations for aviation aggregated $163,145,509.

IN VIEW of the vast sums which the Army has had at its disposal, many congressmen are beginning to ask—and the people of the United States certainly should demand—the reason why the Air Corps has less than 210 effective grade "A" fighting planes in commission at the present time; and also why, as General Foulois admits, in the event of war, "*there is not aviation industry in the country to meet our needs except after a period of from six to nine months.*"

One reason for our failure to create an effective air force, as I pointed out in my preceding article in the April number of POPULAR AVIATION, is partly due to the jealousy of the Army and Navy general staffs.

The military mind is inherently con-

servative, and the powerful social lobby which the Army and Navy maintains in Washington, thus far has succeeded in subordinating our air service to the ground and sea forces. Aviation never will be allowed its full measure of development until it is freed from this blighting control and made an independent arm of our national defense.

But, unfortunately, there is another potent and much more sinister reason why neither military nor commercial aviation in the United States has kept pace with air progress abroad. That is, the existence within our government of a cabal—or inner circle of men close to cabinet members or high administration officials—so powerfully placed that it seems to control the expenditures for the development of aviation which Congress has so generously made.

Consequently, while millions of dollars annually are being paid to a few favored firms, the industry as a whole, instead of being helped, actually has been handicapped through lack of honest competition.

That explains why we have lagged so far behind Europe in the improvement of powerful engines and fast flying planes—and it also explains why, in the event of war, it would take from six to nine months before the industry as a whole could put our feeble, poorly balanced air service upon an effective fighting basis. In the meanwhile, as every thinking person realizes, it might be possible for an alert enemy, in control of the air, to disrupt our industries and transportation and to dictate peace on its own terms.

It is unthinkable—and criminal—that the United States, supreme in inventive genius and manufacturing potentialities, should be allowed to fall behind other great world powers in the vital matter of aviation preparedness—especially since practically all students of military strategy agree that the next war will be settled in the air.

Many of the facts which I am about to set forth never before have appeared in print. It is about time that this shameful conspiracy of silence was broken. Possibly some blunt talking will be needed to arouse the American people to the danger which confronts them through the neglect of their air force. So here goes:

THE plain and unvarnished truth is that a numerically small but financially powerful group of favored insiders—who are the chief beneficiaries of both the civil and military appropriations made by our government—have profiteered grossly out of the nation's need. They have been confident of their continued monopoly and incredibly careless of the public trust imposed in them.

Last year, approximately $33,000,000 was spent by the United States Army and Navy for planes, engines, spare parts, accessories and equipment. Of this sum, $28,000,000—or a trifle more than 84 per cent of the entire expenditures—was paid over to airplane and engine manufacturers owned or controlled by three huge holding companies—with closely inter-locking directorates.

Approximately $16,000,000—or more than 48 per cent of all the money spent by the government for planes, engines and accessories—found its way to a group of concerns owned or controlled by C. M. Keys and associates, representing the Pennsylvania Railroad, the City National Bank of New York and the Chase National Bank of New York.

Another holding company, which receives approximately 25 per cent of the government funds spent for engines and airplanes, also, through subsidiary operating companies, was paid nearly $12,000,000 of a total $19,000,000 domestic air mail subsidy. Ultimate control of this holding company is likewise lodged in interests close to the directorate of the National City Bank.

Concerns controlled by the North American Aviation, Inc., get the largest slice of the governmental appropriations for military purposes. The North American Aviation, a holding company organized under the laws of Delaware on Dec. 6, 1928, owns outright the Sperry Gyroscopic Company and the Ford Instrument Company, and also has a controlling interest in the Curtiss-Wright Corporation and the Douglas Aircraft Company which specializes in military and naval planes.

The Curtiss-Wright Corporation controls the Keystone Aircraft Company, the Loening Company, the Moth Company, the Curtiss-Caproni Corporation and the Robertson Aeroplane Manufacturing Company.

Practically all these concerns manufacture planes, engines or accessories under non-competitive government contracts. During the fiscal year of 1931 concerns affiliated with or controlled by the North American Aviation company were paid approximately $16,000,000 of U. S. government funds—*not* including what they also received under the air mail subsidy.

(*Continued on page* 322)

POPULAR AVIATION PETITION

for

FREE CIVILIAN TRAINING

We, the undersigned, petition the United States Government in the interests of National Defense:

(1) To refuse any further appropriations for the purchase of airplanes or airships which are designed for limited production at high prices—

(2) To organize a Free Civilian Training Plan by which boys and young men can be given flight training for future military service should the necessity arise for their service—

(3) To encourage the mass production of popular type aircraft, trainers, and military types, of low cost and suited to the equipment and capacity of all aircraft manufacturing plants—

(1) *Name*.....
Street or R. F. D.....
City.....*State*.....

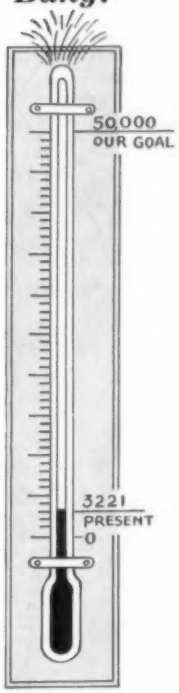
(2) *Name*.....
Street or R. F. D.....
City.....*State*.....

(3) *Name*.....
Street or R. F. D.....
City.....*State*.....

(4) *Name*.....
Street or R. F. D.....
City.....*State*.....

(5) *Name*.....
Street or R. F. D.....
City.....*State*.....

Bang!



We have made a good start but need a lot more to reach boiling point.

BOOST IT

NOTICE! Additiona lnames and addresses may be written on an attached sheet—attached to this petition. Direct the petition to POPULAR AVIATION, 608 S. Dearborn St., Chicago, Ill. Extra copies of this petition blank have been printed and are available on request.

A Reader Designs Plane for P. A. Civilian Air Corps

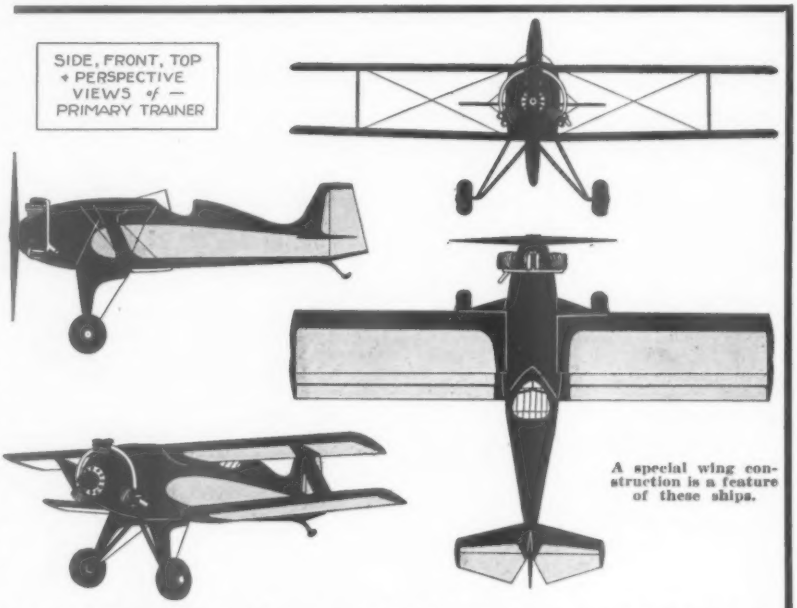
Filled with enthusiasm over POPULAR AVIATION'S Civilian Training Plan, Harry Lake designs two trainers specially adapted to this purpose.

THE movement started by POPULAR AVIATION for a free training system under government control, has awakened much interest in all branches of aviation. However, it has remained for Harry F. Lake, an aeronautical engineer of Viroqua, Wis., to design two training ships especially for this service.

Mr. Lake intends to go ahead with the construction of one ship, and when conditions justify the expense, he will start into production with them. As an engineer he has had a considerable amount of experience in lightplane design, and he has gone into the matter very thoroughly, even to the preparation of the stress sheets and aerodynamic calculations. Outline drawings of the trainers, prepared by Mr. Lake, accompany this article.

First, is the primary trainer for the beginners, a biplane of neat appearance and of a type eminently adapted to our training program. He expects to market this ship for the exceedingly low price of $750.00. After training is completed on this ship, the student will be transferred to the higher powered and speedier secondary trainer shown herewith. This ship is to list at $1,700.00.

By the adoption of many novel features in building the structural members, it is possible to produce these ships at a low price, even when the volume of production is small. Further, this construction permits of cheap and simple repairs. The specifications are as follows:

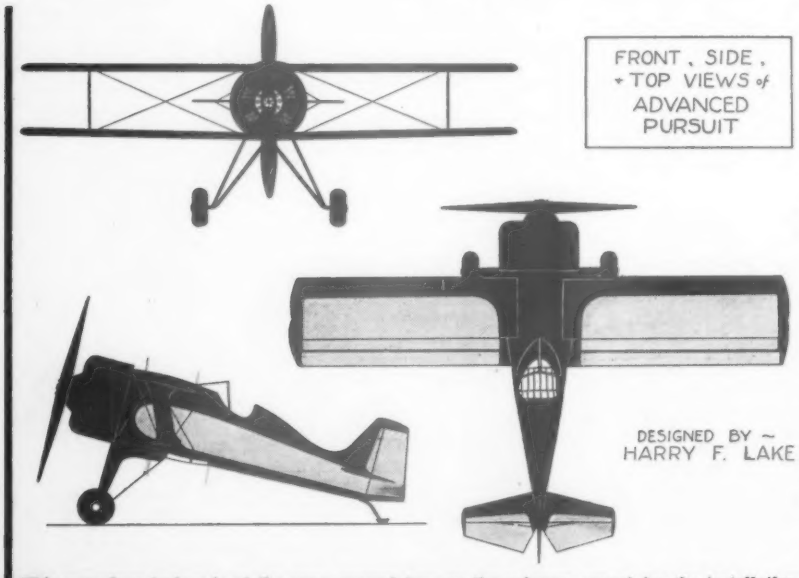


A special wing construction is a feature of these ships.

Note the clean-cut design of this little biplane and the exceptionally good field of vision. The visibility is fully as good as that of a low wing monoplane.

SPECIFICATIONS FOR "P. A." TRAINERS

Item	Primary Trainer	Secondary Trainer
Span of wings	18 ft. 0 in.	18 ft. 0 in.
Chord of wings	27 in.	27 in.
Area of wings	72 sq. ft.	72 sq. ft.
Length overall	13 ft. 0 in.	13 ft. 0 in.
Weight, loaded	650 lbs.	750 lbs.
Horsepower	45 h.p.	80-90 h.p.
Maximum speed	120 m.p.h.	160 m.p.h.
Landing speed	45 m.p.h.	50 m.p.h.
Climbing speed	1000 ft/min	1500 ft/min



This secondary trainer is of the same general type as the primary, except for the installation of a heavier engine.

It will be noted that Mr. Lake has adopted the biplane type for both the primary and secondary trainer. However, he has arranged the wing units in such a way that the field of vision is unusually great. In many respects, a biplane offers the greatest advantage for this class of service.

A special landing gear permits of exceptionally rugged members, so desirable in trainers, and at the same time the shock absorbing qualities and clearance are well suited to rough fields.

Standard engines are to be installed in both ships, a 3-cylinder engine for the primary trainer and a 5-cylinder type for the secondary ship. According to the design characteristics of these trainers, the installation of a 45 h.p. engine in the primary and a 80-90 h.p. engine in the secondary should give the excellent estimated performance shown in the specifications.

In the event that there is delay in gaining governmental action on the petitions, Mr. Lake has devised an ingenious organization by which local training units can be established at an absolute minimum of expense. POPULAR AVIATION is quite proud to be the inspiration for this interesting line of trainers and we thank Mr. Lake for his interest.

XUM

When Blind Flying is Advisable

by LIEUT. D. W. TOMLINSON

A detailed description of the methods followed when flying a ship at "zero visibility".

THE subject of blind flying, so-called, has on many occasions led to interminable arguments and even blows. I once sat in on a hangar discussion of this problem which wound up in a riot call. No two pilots fly exactly the same. It is only natural that there should be many diverse opinions on this all-important angle of flying.

Unfortunately, however, those best qualified through actual experience to describe the reactions of a pilot flying without an horizon rarely combine with this peculiar ability the art of writing.

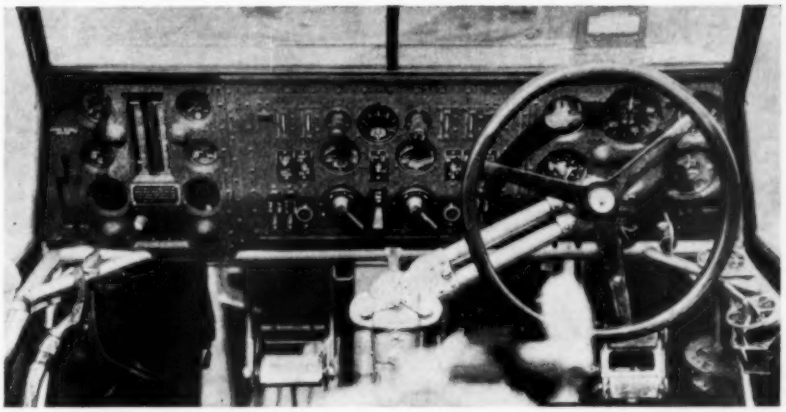
Before going further we should know and define the conditions under which, for the purpose of this discussion, a pilot may be considered to be flying blind—or without an horizon.

The first step is to eliminate completely the problem of navigation. We are interested merely in the problem of how the pilot is going to control the airplane under specific conditions. If we can maintain normal flight and hold a course the greatest obstacle has been overcome.

Speaking broadly, there are two types of flying. The first is horizon flying. Probably 99 per cent of all flying at the present time comes under this heading. In this case the pilot depends on his natural senses of balance and orientation to keep his plane in level flight or to maneuver it at will.

There are three senses which enable a pilot to do this. In the order of their importance, they are: sight, balance and deep-seated muscle sense. These faculties are closely allied and, in the final analysis, depend upon the sense of sight as the final check on the other two. So long as the eye can see some fixed object on the ground or in the sky a pilot may rely on the human instincts to maintain level flight.

The second type of flying (and the one with which we are now concerned) is the problem which confronts a pilot when he is unable to refer his senses of equilibrium to a fixed point in relation to the earth. He is then at the mercy of the vagaries of human nature which, with subtle fiendishness, tell him that the airplane he is flying is doing exactly *opposite* to that which it actually is doing. His only recourse is to detach himself completely from the dictates of his natural impulses, and to rely upon instruments which show the true actions of the airplane.



U. S. Army Air Corps Photo

The instrument board and cockpit of an Army Air Corps bombing plane. Note that the wheel can be swung over from the pilot to the co-pilot.

THE opinion exists to a great extent that the only time a pilot is flying blind is when he is flying through a cloud. This is not the case, as it is possible to fly through many cloud formations and still see the ground.

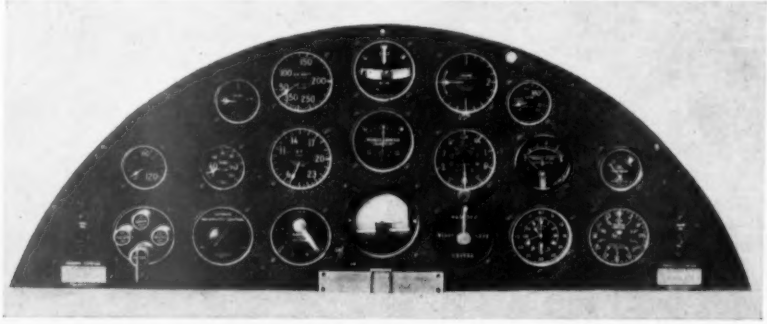
Frequently a plane may be invisible to an observer on the earth, yet the pilot flying it can see the ground, or enough of it to satisfy his sense of equilibrium, so that he need not rely on his instruments. On the other hand, a pilot may not be flying through clouds at all yet be entirely dependent on his instruments.

The acid test is whether or not the pilot can see some point or shape which he can positively identify in his mind as being fixed in relation to the earth. If the point or shape be in the sky—a star, a cloud or another plane—the pilot must be satisfied in his own mind as to the position of such an object as related to the earth. The problem, then, is truly psychological.

The determining factor as to when a pilot must depend on his instruments thus becomes that of visibility. There are conditions, however, where a pilot can see for many miles, but when there is no object by which he can gauge his position, he is as dependent upon his instruments as though he were in a cloud so thick that the wing tips of his plane were obscured.

As an example, he may be flying at night over an uninhabited stretch of country, completely devoid of lights and with a solid overcast sky with a comparatively low ceiling. When flying at night between two solid layers of clouds, there is no reference point.

The condition most commonly encountered is that of storms or fog formations which rest on the ground and extend upward anywhere from a few hundred feet to ten thousand feet or over. These are the obstacles which handicap the airlines in carrying out their schedules. When an airplane meets them the pilot must either turn back, land, or fly by instrument. The decision is one which todays rests upon a thousand and one considerations beyond the scope of this article. What we are chiefly interested in is how the pilot may fly through such conditions,



A fully equipped Instrument board for a civilian commercial airplane. By the use of these instruments, and there are plenty of them, the pilot can fly blind.

presuming that this be the logical and sound procedure.

The time is rapidly approaching when the pilots of the air transport lines will have to become skilled in the art of flying their planes for considerable periods entirely by instruments. Until that time comes air transport cannot achieve the degree of dependability which surface forms of transportation now possess. Realizing this fact, one large airline company has begun an extensive program of pilot instruction in instrument flying.

THE first thing a pilot must have is a thorough understanding of each instrument involved in flying blind. He should know the principle on which the instrument operates, its peculiarities and even its faults. This information is secured in a classroom or a shop where each instrument can be taken apart and explained in detail.

The next step is flight instruction in an airplane with a safety pilot. Both cockpits are completely equipped with duplicate sets of instruments. The pilot receiving instruction is in a cockpit with a hood which can be pulled over the top of the cockpit, completely cutting off his vision outside the airplane. He can see only the instrument panel which is electrically lighted and the inside of the cockpit. Thus, he must rely wholly on the instruments to tell him the position of the airplane in relation to the earth.

Before attempting to fly by instrument either in an instruction plane, or in a regular line airplane, the pilot should satisfy himself as to the reading and action of the various instruments. The turn indicator should be watched while the airplane is in straight flight to make sure that the needle indicates zero. Sometimes it may be slightly off center.

When the compass is placed below the upper wing it is more easily visible.

Turns should be made to left and right to check the degree of sensitiveness and to determine how steep a bank turn is indicated by the position of the needle. The compass may be checked

(*Continued on page* 330)

Flying Togs For High Altitude Work

All dressed up with the latest high altitude flying equipment—masks, liquid oxygen connections and all.

FLYERS to the upper altitude are forced to protect themselves against the extreme cold and lack of oxygen with this grotesque looking equipment. They have been likened many times to the anthropoid ape. It is not a very bad description.

Some of the details of the equipment are very interesting. For example, the special type face guard, which in addition to the ability to protect against the extreme cold, is at the same time an oxygen mask.

Prior to the protection of this mask, extreme altitudes were utterly impossible. It was a question of the man-ceiling rather than the plane-ceiling.

The illustration shows the equipment used particularly for high altitude map making.

An Antiquated Type of Chinese Bomber

THIS giant Chinese bomber is of very antiquated design, and badly matched with the modern Japanese planes that have been used over Shanghai.

In spite of this, the commanding officer of the Chinese forces plans to use them at the earliest feasible moment to wind up his campaign against the Japanese invaders. He states that the trouble will be cleared up as soon as his plans are perfected. He claims that in spite of the several weaknesses of these planes that a scientifically planned attack with these unwieldy ships will bring the Japanese invasion to a sudden end.

After a careful examination of the plane, if one has an imagination in good working order, the plane has somewhat the lines and "feeling" of the traditional Chinese dragon.

This cumbersome Chinese bomber, used at the beginning of the recent war, is now being replaced by more modern types.

How Our War Aces "Misbehaved" at Training Camps

Some amusing incidents that took place at training camps during the World War

by
LIEUT. J. M. RICHARDSON

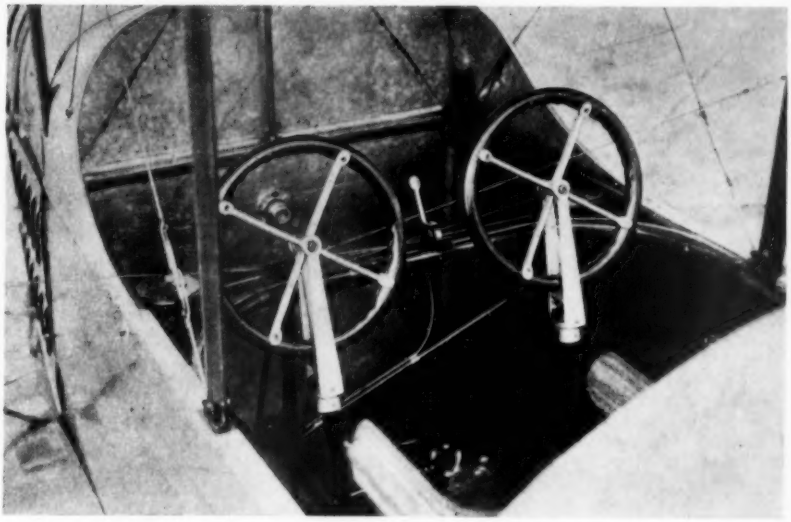
NOT all the superb, the miraculous or, in fact, the absurd flying in France took place at the front. Far from it.

There is a long list of escapes and odd antics in the air, forming a part of the history of our colossal flying field at Issoudun, that made some of the escapades on the front, step into second place. One of the most unusual of these queer stunts happened at Field 6, the "acrobatic field."

At Issoudun, the student aviator learned to do acrobatics while flying alone. Following several hours in the 15 meter Nieuport, spent in landing at the mark, in altitude work and in cross-country flights, he went to the acrobatic field. Here, near the road, sat the fuselage of a machine equipped with stick, rudder and flippers but lacking wings.

An instructor would climb into this fuselage and show a student pilot what movements of the controls he should make to do a tail-spin, a renversement and a side-slip. After this demonstration, the student climbed in and went over the movements several times with the instructor looking on.

Oscar Brindley, one of the first airplane instructors employed by the U. S. Army.



Controls of a wartime "dual controlled" training ship, very crude when compared to modern design.

This was the only aid in performing acrobatics that an airman received in Nieuport training. The rest was up to the student. He had to go aloft and execute the movements until the instructor on the ground felt that he was amply proficient to proceed to formation flying and sham combat work.

It was but natural that the embryo aviator's first flight in acrobatics found him shaky. And it was also true that his first renversement and side-slips were often shoddy. It took skill to perform these properly. Watching aviators try their first side-slips and renversements, I have seen them perform many queer evolutions that nobody could quite explain. They often, in fact, got the Nieuport on its back and only with difficulty succeeded in throwing it over on an even keel in an upright flying position.

This was hard to explain, because it was not the tendency of a Nieuport to stay on its back, and many pilots were unable to make it do so. On my first day at the acrobatic field, I saw a pilot get a machine on its back and work frantically to right it. This he could not accomplish, and the plane glided to the earth in that position—crashing badly.

IT WAS several days later that I saw a stunt I shall never forget. A tall, dark-complexioned lieutenant named Chamberlain took to the air to perform his renversement. His first attempt ended in a tight spin from which he finally emerged. Climbing again to 5,000 feet, he started another maneuver, and I noted that his plane was diving precipitately in a line of flight that had its path directly towards me.

He was dropping at incredible speed, his motor wide open, when suddenly his plane nosed straight down, went past the vertical point, whizzed through a wide, downward arc in the sky on its back, began to climb up again from its upside down position and finally snapped back into a normal line of flight.

When he was half through the maneuver, Roswell Fuller, who was standing beside me, yelled out: "What the hell is the fool trying to do?"

Nobody had time to guess, but in less time than it takes to tell it, Chamberlain's plane reached a normal line of flight and everybody, wide-eyed with astonishment, realized that he had seen a perfect outside loop performed.

"An outside loop," shouted Fuller excitedly.

Dogan Arthur, Frank Luke (the "balloon buster"), a mechanic standing there and myself knew that Fuller's eyes had not deceived him.

Just then, Albert Smith, who had seen this stunt from the side, ran over to our group and said, "He did an outside loop. I guess that's something for the peelots to shoot at."

All of us were practically certain that it was the first one ever performed by an American, though entirely involuntary.

THE inside loop, a common stunt of airmen, we knew was no more difficult to accomplish than turning a cor-

ner in an automobile. Most of us, standing there, had done the inside loop dozens of times and we realized that a pilot could flip his plane over indefinitely in this maneuver without imperiling himself by putting a strain on the plane.

But in doing an outside loop, he would have a tremendous centrifugal force to contend with—so tremendous, really, that we wondered how the plane had stood the strain and how Chamberlain had been able to stick with it. It was amazing that the force, whirling outward, had not dislodged him in spite of the safety belt, which was not made to withstand such rough treatment.

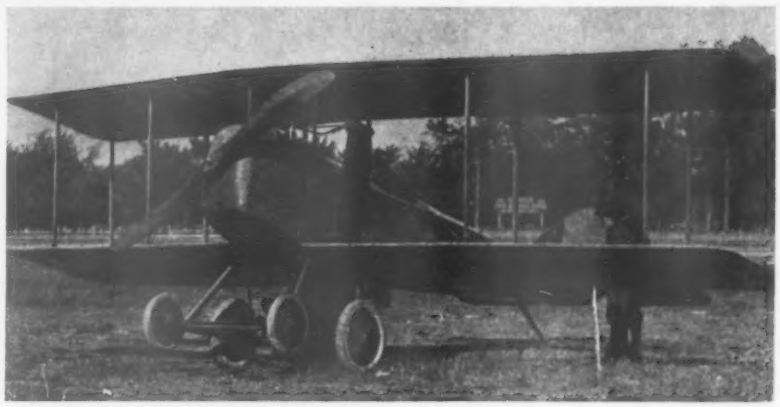
After his great feat, Chamberlain did not climb again to finish his stunts, but gradually came lower and wandered about aimlessly, his plane on the verge of losing its flying speed several times.

"What's the matter with him now, do you suppose?" Fuller asked.

Suddenly, he circled the Nieuport over the trees and came in to land with the wind—a very dangerous trick. His landing almost gave us heart failure; he levelled off too high and without the restraining force of the wind, shot dizzily across the field. At last the Nieuport lost its speed and settled to the ground like a bag of rocks, crushing the undercarriage.

Chamberlain was standing beside his machine when we reached it. Obviously he was unhurt, but I had never seen a man so pale in my life. Normally a dark-complexioned man, Chamberlain had become as white as spotless snow. In reply to our questions he mumbled vaguely like a delirious person.

An hour or so later he recovered his composure, but he was never able to tell anybody what he did to his controls to perform that outside loop. Unfortunately, therefore, the secret of performing this evolution, which we had frequently discussed, was not captured at that time. But even had Chamberlain been able to instruct us, I am reasonably sure that none of us would have had courage enough to try it in a Nieuport.



An American training ship, the "Standard" biplane, a contemporary of the more famous "Jenny". Note the four-wheel landing gear designed for the prevention of "nose-overs".

In addition to those who were on the stunt field at the time the loop was made, one other reported seeing it, Instructor Ott from the double-control field. When Chamberlain swung down in the wide sweeping arc of the loop, Ott was flying nearby and saw the complete performance.

THERE was a class of pilots at Issoudun who did flying of a perpetually dangerous character. I refer to the men who instructed on dual-control machines. Not only did their work require skill of the highest order, but it required a great deal of courage.

Yet, but scant praise is paid these stout fellows who day after day fought over the controls of the trickiest training machine ever used by any nation. They got no medals, but there were many of them deserving of honorable reward for devotion to duty.

It was one thing to give instruction on the Caudron or the stable Curtiss. It was quite another to teach a student aviator how to control a whimsical Nieuport, a machine that spun and side-slipped with startling suddenness and was difficult to bring out of these maneuvers at low altitudes, especially if one had a student clinging to the controls.

And the dangers of instructing on a De Haviland were almost as great, because so many of the students had had insufficient primary training. From the very nature of the work, fatalities often resulted and instructors figured in many thrilling escapes where they seemed to have hardly one chance in fifty to survive.

Lieutenant J. S. Hand, instructor, was cruising about in the airplane-infested air near Issoudun one day with a pupil of his. Close to his line of flight, several machines were practising virages. One of these, piloted by a solo student, was doing a tight turn and came out headed for Hand's machine.

At the last moment, the other plane almost upon him, Hand saw it and dived sharply to avoid collision. They were too close, however. The tail of Hand's plane, inclined upward on the dive, was struck by the wing of the solo student's plane. Instantly the solo student's plane spun into the ground, killing the luckless pilot.

The impact threw Hand's machine on its back and he started falling in a partial nose dive in this upside down position. Using all his skill, Hand endeavored to put his machine on an even keel again.

It just would not respond completely to the controls and drifted downward in spite of all his efforts, finally forcing him to desist because he had no more altitude to fritter away in experimenting with the problem of regaining a normal flying position. Death seemed near, and Hand, though he realized perfectly the helplessness of his position, retained remarkable presence of mind.

WHY not, he thought, try to make a landing on my back. When a plane is upside down the movements of the controls longitudinally are reversed.

The earth was rushing up at him now and looked like a giddy, whirling saucer with one rim inclined higher than the other. He tried putting his theory into practice. The moment he

(*Continued on page* 332)

Early dual instruction in the army. On the right is "Doc" Wildman, one of the army's earliest airplane instructors. On the left is Lieut. Gerstner.

XUM

Lowell Bayles-His Life and Career

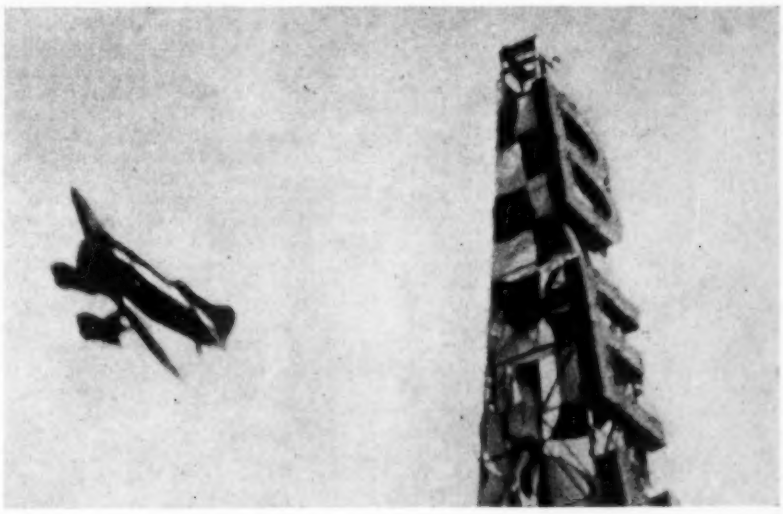
by STUART E. KNUEPFER

Interesting facts in the life history of Lowell Bayles who left an indelible mark on American aviation.

SPECTATORS crowd the grandstands, bright with color, enjoying the thrills of a great aircraft show. At the present moment, thousands of eyes are watching a comparatively little plane, its smooth sides shining in the sun, climbing for its fourth dive over the marked mile course. Three times already had the plane sped over the straight-away directly in front of the stands and after this try, the fourth, the speeds were to be averaged.

An expectant hush falls as the plane hangs for a split second, and then dives to the course with a tremendous roar. It hurtles past the upturned faces in a flash of color and continues its terrific pace to the end, afterwards coming to rest like a wearied eagle. The announcement which soon follows tells those onlookers that they have witnessed the establishing of a new unofficial American speed record, for land planes, of 267.342 miles per hour. More than that: they also learned that on one of the dashes over the course, the plane flew at 286 miles per hour, bettering the world's speed record by almost eight miles per hour.

This little plane, a Gee Bee Super Sportster, powered with a Pratt & Whitney Wasp Jr., carried Lowell R. Bayles, one of the most interesting and most popular fliers in the field of aviation. Besides accomplishing the feat described above, Bayles also won the Men's 50 Mile Free-for-All Closed Course Race, open to planes with engines of 1,875 cubic inch displacement, with a speed of 206.001 miles per hour. Following this, he captured the Thompson Trophy Race with a speed of 236.239 miles per hour, bettering the former (1930) speed by almost 35 miles per hour, and establishing a new speed record for planes over a 100 mile course. It is needless to say that Bayles made himself known at America's Speed Classics.



Lowell Bayles rounding a pylon in his "Gee-Bee" racer, going well over 200 m.p.h. at the time this picture was taken. He is hugging the pylon closely.

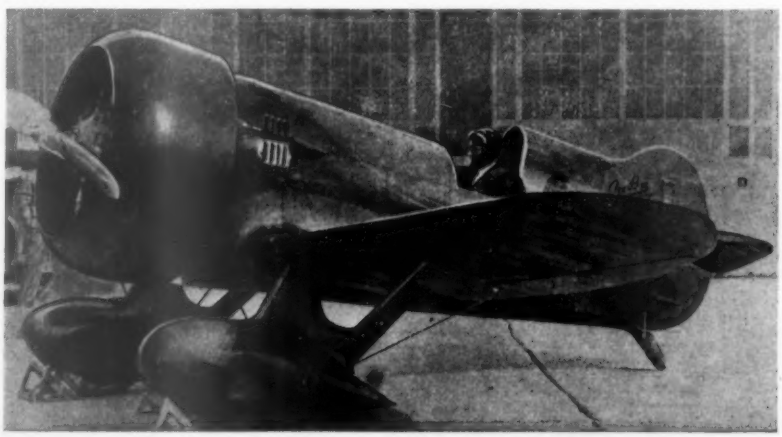
Student, barnstormer, tester, designer, and daredevil, Lowell Bayles had flown his way from obscurity to nation-wide plaudit and fame with notable daring and skill. From the early years of boyhood, he had carried with him the sense of humor and the personality that endeared him to all he knew. Always planning further accomplishments in a quiet, unassuming manner, his ambition reached high water marks. Shall we turn back the hands of time to Jan. 24th, 1900, and pick up the background of an unusual life.

It was on this date that Bayles was born, in the small Illinois town of Mason. There is no record of his attempting an Immelmann, or a barrel-roll, on the day of his birth. We can only assume that, like most children, his first announcement was a lusty cry.

When he was eight years of age, the family moved to Newton, Illinois, and it was this town that he later called home. During the very early years of his life, anything on wheels held a great fascination for him, A tricycle was his first treasure, followed by a bicycle on which he would pick the most difficult hills to either climb or coast down, at a breakneck pace.

Stairs were also a passion with him. In fact, anything that would offer to be "a tough nut to crack" spurred him on. Perhaps the first capitalization he realized on his accomplishments was a two dollar prize for a Fourth of July bicycle race. It is needless to say that this event left him at the height of his glory for some time.

So much for bicycles. Bayles next turned his attention to all the automobile garages in town and for two successive summers, worked eight hours a day in one of them without pay of any kind. In a short while, he could take an engine apart, repair it, and put it back together again. This, and it is interesting to note, occurred when he was of mere Junior High



Lowell Bayles in his record breaking "Gee-Bee" monoplane, just before his historic race at Cleveland, O.

School age. He profited greatly by this mechanical training because the knowledge gained, served him in good stead later on.

WHILE still a young boy, his daring was already making a place for him in the town life. Although never unduly reckless, his sense of humor and his restlessness got him into many scrapes and much mischief; it also gave him leadership over "the gang".

During his first year in High School, to cite an example of the type of thing he got into, his father purchased a new car. One day after school, Bayles took the car to the race track and began driving around at a slow pace. As the story goes, another car tried to pass him on one of the curves, only to find Bayles in the way and determined to hold the lead.

Notwithstanding the fact that the automobile was new and had not accumulated any mileage, he opened it up to its full capacity with the result that the track soon became a speedway. His father, in passing, wondered what great event was raising all the commotion. His curiosity, we are told, was soon satisfied, for, on looking over the fence, he saw his brand new car going around the track on two wheels.

Another time, perhaps to spend some of the energy he had accumulated, Bayles staged a twenty-five mile endurance race. His rival, and his chum, was Sid Hinds, now a crack shot of the American Rifle team. The race resulted in a tie, but was an indication of the spirit of competition that Bayles was already feeling within him.

It was soon after this, when he entered the University of Illinois at Champaign, that he purchased a motorcycle. He called it "The Ace" and every motorman on the Champaign-Urbana electric line learned to know him on sight and, for good reason, to fear him for his favorite trick of cutting directly across the tracks in front of the moving cars. The more exasperated they became, the greater chances he took.

Lowell Bayles climbing out of the cockpit of his "Gee-Bee".

Bayles studied mining engineering at Illinois but, because of trouble with his eyes, had to leave after his freshman year. While flying had naturally been a boyhood ambition, he had chosen mining as a livelihood and, to follow his career, secured a position as a mine electrician in mines at Sesser and Christopher, Illinois.

In 1924, after working in the mines for three years, he met Captain Robert Blair, an Army flier. After a short acquaintanceship, Blair promised flying instructions to Bayles, providing enough capital could be secured to enable them to begin the lessons. Bayles went into private conference with himself and immediately after, negotiated for the sale of his motorcycle. With this money, his savings, and some cash Blair had, they purchased a reconditioned "Jenny", in which Bayles received a few lessons.

Lowell Bayles soon learned, however, that nature has a temperament just as inconsistent and volcanic as an opera star. One day, with the Jenny proudly anchored in a small field, an imitation tornado suddenly arose and blew the glory of his life to the four winds. His future collapsed. Shaking off the despondency that naturally followed this catastrophe, he went back to the mines and, after working several months, pooled his earnings with a fellow mine worker to purchase another Jenny.

Blair flew the plane to Christopher —where Bayles was then living—and promised to be back in two days to finish the lessons they had begun. For some reason or another, he did not arrive at the specified time. Bayles, restless to try his mettle, jumped in the plane and nonchalantly flew about while the other half-owner said his prayers to the Deity who protects all fledglings.

Bayles flew all over the countryside for two months, before deciding to let his parents in on the secret. He had been wise enough to keep the beginning of his airplane venture from them, because they would have immediately vetoed any such scheme. Now, equipped with a *real* airplane and a Department of Commerce license in his pocket, permitting him to carry passengers, he made a victorious entry into Newton. Once there, his parents had no other choice but to give in to his wishes and Bayles began to carry passengers at the Jasper County Fair, which was then in progress. The first day ended in a halo of glory for him and for the community, but the second day was destined to bring new obstacles into his life.

During the afternoon of the second day, Bayles took up a woman passenger and began a routine flight over the countryside. In mid-air, and over a large apple orchard, his motor decided to take a permanent rest, leaving him

(*Continued on page* 335)

'Chutes for Dropping Airplanes

Ship descending with only one parachute. The other 'chute is fouled on the top wing at the right. The descent was therefore too rapid.

AS WE have mentioned from time to time in POPULAR AVIATION, experiments have been and are being made with a view of attaching parachutes to the whole airplane instead of simply to the pilot or passengers individually. There has been a great deal of discussion on the subject, and much difference of opinion expressed on the method to be adopted—and so far nothing definite has been arrived at.

In the accompanying photograph, we see a plane being lowered by two parachutes—an experiment that was not highly successful. In this attempt, the plane was badly cracked up and the pilot was seriously injured. It is said that the trouble was due to fouling the second 'chute.

What Have We Here?

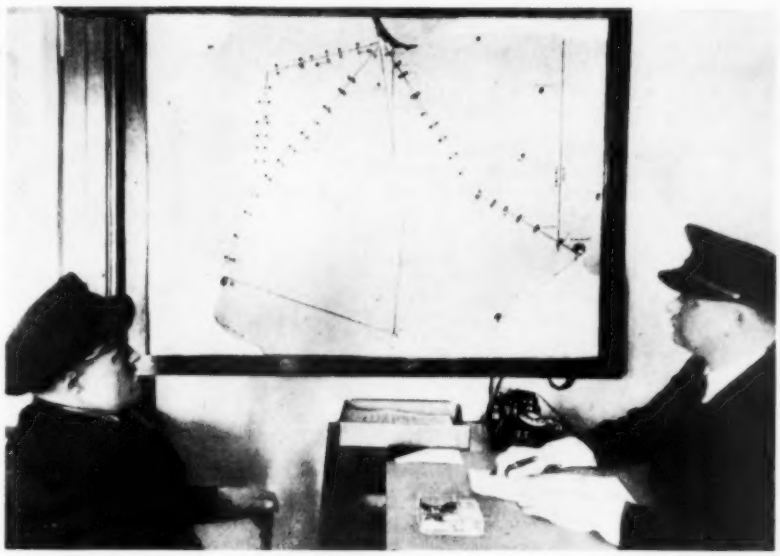
THE latest in water taxies is the "aeroboat." It is a combination of a of a seaplane equipped with an outboard motor used by the Gorst Air Transport Company as regular equipment in its passenger service between Seattle, Bremerton and Victoria.

A combination seaplane and motor-boat taxies with an outboard engine.

A Day at the Airport With the Dispatcher

by HARRY K. HOBART

Passenger and mailplanes on scheduled runs are operated with the precision of railroad trains. In this article, Mr. Hobart describes the daily dispatching routine at a typical airport.



The location of the planes, and their progress over the airline, is indicated by tiny electric lamps located on the wall map. Every move is made easily visible.

ONE of the most interesting phases of railroad work is that of the train dispatcher. In this modern age we now have another sort of dispatcher whose work likewise promises to be both interesting and exciting—it is the aeroplane dispatcher.

There is no more interesting place at an airport than the dispatcher's room. Along one wall are sheets of different-colored paper. On them are pasted weather reports from the ports along the air routes, so that the pilots can glance over them. They not only get a perfect picture of weather conditions but also of the condition of the various fields.

At one side is a map on which the routes are traced in colored pins so that, at a glance, he may see the source of every report and its possible effect.

In addition to these reports from the weather stations, there are reports every twenty or thirty minutes from planes in transit, so that the slightest change in the weather may be recorded and transmitted to any pilot.

Now for a picture of the dispatcher's work. It is about four o'clock in the morning at an Eastern airport. A lone dispatcher sits in the office and listens to the cold cutting wind blowing up eddies of dust that pelt the windows of the office and rattle along the hangars. The darkness outside is impenetrable. It is always darkest just before dawn. He knows that somewhere to the west, driving through the storm, is a plane seeking this dreary field.

Giving the pilot the "high-ball" with a signal very similar to the switch signals used on railroads.

Suddenly, there is a drone from the loud speaker in the dispatcher's room and a far-off voice calls, "5698, 5698."

"O. K., 5698, Valley Stream," says the dispatcher.

"5698, 5698, 10,000 feet, good visibility, northwest wind, position 8-B, position 8-B, O. K."

The message is repeated by the dispatcher, then he turns and puts a pin labeled 5698 into a map ruled in squares to correspond with the location figures given him by the pilot.

Twice more the reports come in, the last call being only a few miles away. Then the dispatcher snaps off his instrument and we follow him out into the darkness. Far away is a pulsing hum, the song of a plane riding the west wind.

TWO tiny lights appear. There is a roar overhead and the plane sweeps across as the flood lights and boundary lights are turned on, making a path of silver for the plane to follow. Around in a large circle it flies and then dips into the light, sliding down with a shrill whistling of wind in the wires. It touches lightly and then with another burst of sound rolls up to the hangar door.

The pilot rises from the cockpit and looks up in surprise at friends who have come out so early to see him land. The attitude of any one who has the slightest curiosity about the night airmail is incomprehensible to him. He has flown it for years. From his cockpit he takes a magazine. He has been reading an adventure story as he flitted through the night at 10,000 feet on the heels of a gale!

The next act in this daily drama of the airport is announced by the sputter of a motor behind one of the hangars. It is a plane warming up to take newspapers and mail to Washington. Another is taking off for Newark with passengers who want to get a plane for Chicago there.

Later still, a mail plane starts for Boston and after that another takes off for Montreal. With these first planes we start a busy day. There are 108 scheduled planes in and out every day and 400 passengers are carried on an average. This is true, in greater or lesser degree, of all the airports in the United States.

They slide in deliberately at the end of their journeys, roll up to the landing platforms and unload their passengers. Likewise they depart, with no more of an atmosphere of adventure than there is about the Grand Central Station. Passengers sometimes look nervous as they board a plane, but they invariably land looking bored.

IN THE waiting rooms of the various lines men, women and sometimes children wait for the planes. They have had their tickets validated, their baggage weighed and their seats assigned. Your dispatcher sees to the routing of each plane that leaves the air-port and the time at which it leaves.

Passengers are admitted to the plane

only five minutes before it leaves. The pilot gets his orders from the dispatcher before leaving and a complete weather report covering all stops on his route.

When the plane is ready to take-off, an attendant runs out on the field with two flags, one white and one red. He holds the red one in the air until he is sure that the plane is in no danger from other craft. If the sky is clear he gives the signal with the white flag, and in a minute the big ship is in the air.

Planes come and go with such regularity that one almost tires of watching them, but the dispatcher never tires. Day or night, when he hears the hum of a plane, he turns or goes out of the office, just to see how it lands. Even though one has seen over a hundred thousand landings and take-offs, the fascination still holds. It is still a novel sight to the human race.

AN EXCITING part of the dispatcher's work is in warning planes of sudden and unforeseen storms. Not long ago there was a squall near Valley Stream which seemed to come right up out of the sea. It was so unexpected, and of such violent strength, that it might have been a hazard for passenger ships.

The dispatcher got in touch with the pilots of all incoming planes and in ten minutes every one of them was on the ground at an emergency field.

Even a plane on the ground can get in touch with the home office or any other radio station equipped for receiving their calls. One time a pilot on a southern route was forced down in a field by an air bubble in his fuel line. When he landed, after a rather bumpy ride over broken ground and stubble, he began to cuss, forgetting that his radio was on. He did so with such enthusiasm that reports came all the way from the Pacific Coast of his picturesque profanity.

In the dispatcher's room, a plane bound west, just outside of Cleveland came on the air. The pilot was calling Cleveland without being able to raise the dispatcher at that field.

"There's a blind spot there," said the Valley Stream dispatcher as he adjusted his instrument.

"4973, 4973, Valley Stream calling, Valley Stream calling. I'll relay you to Cleveland."

IMMEDIATELY the pilot gave his position, the Valley Stream dispatcher signed him off and called Cleveland, repeating his message. From Cleveland came an immediate acknowledgment, and then the words, "Albany, Newark, Buffalo," came over the air as the dispatchers at those stations also indicated they had heard.

The repetition of the names of other fields follows after practically every meessage, showing that all along the line dispatchers are listening in for any indications of trouble. No greater assurance of the care with which flying is conducted could be given than by a visit to one of these dispatching offices.

Diminutive Plane Beats Record

At right, we see the "G-Abre" after landing in Sydney, Australia. Note the method of mounting the wing, a rather unusual method.

Below, we see the little ship taking off at a rather steep angle of climb. Note the very deep fuselage used here.

THE "G-Abre" is considered the smallest practicable plane in the world. The pilot, C. A. Butler, holds the smallest pilot record.

The two of them, the smallest pilot and the smallest plane, recently flew from Heston Airdrome, England, to Sydney, Australia, clipping an hour off the previous record. The flight was made in nine days, one hour, and thirty-two minutes.

One of the photos shows the ship in flight, just after the take-off. The other shows them shortly after landing at Sydney.

While the deep fuselage may be a protection to the occupants of this plane, yet it must interfere with the vision.

Falls, But Without Danger to Passengers

M. SAUVANT, a former French naval aviator, believes he has invented a plane with which it is possible to fall from great heights without danger to the passengers. Animals and fragile articles have been dropped in test-planes with complete success.

The safety feature is based on the use of several shells to form the cabin, and together with a system of bumpers to absorb the shock.

Recently he planned an experiment to prove that human beings were perfectly safe. Somehow the police are not in favor of such experiments, and prevented the attempt.

View of the French cushioned plane that is claimed smash-proof.

Famous Planes of the World War

WHILE we have printed pictures of many German wartime planes in previous issues, yet this is the first time that we have shown German seaplanes. Photos of these seaplanes are quite rare, therefore we trust that this page will be a valuable contribution to your album.

Here we have a view of the well known Junkers J-4, a ship of which you have frequently heard. It has a characteristic spindle shaped body with the cylinders above the body in a separate compartment.

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The "Million Dollar Fire" at Combey where discarded ships were heaped into one big bonfire and burned—just one more example of the appalling waste of war. The insignia on the wings indicate German as well as Allied ships.

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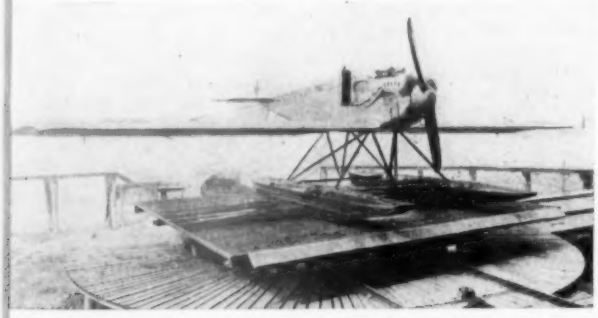

Another Dornier, this time it is a low wing monoplane seaplane with two pontoons. This would appear to be the most practicable of all the wartime Dornier seaplanes as it incorporated many of the ideas now considered modern.

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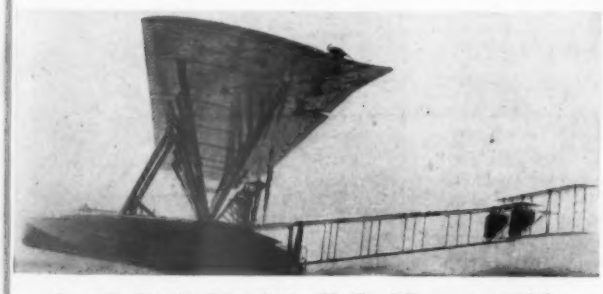

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A Dornier type R-S-4 seaplane. A peculiar design with the engine and pilot's naccile located between the pontoons and the upper fuselage. The latter was evidently for the accommodation of officers.

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Is this a German Roland? Yes, this is a Roland according to history. It is evident that its designer admired the "Spad" from the appearance of the fuselage and from the setting of the wing cells.

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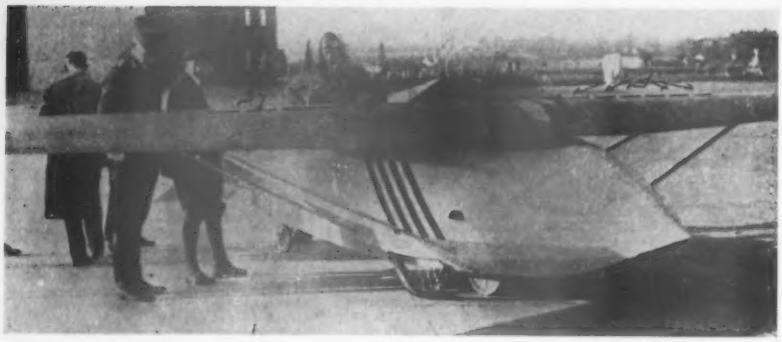
A German Propellerless Airplane



Here we are looking at the rear of a recent type Canard plane, driven by air forced through the slots (S) in the wings.

LUDGER VOLPERT, a German inventor, has designed this interesting, propellerless plane. The idea came from watching gliders.

Driven by the reaction of air passing through the slots (S) cut in the rear of the wing. This gives an effect similar to the reaction of the gas stream issuing from a rocket. The air is supplied by a compressor.

The air stream is supplied by an engine-driven, rotary-compressor, located within the body.

Our readers will probably remember that a similar method of propulsion was suggested in a past issue of POPULAR AVIATION by J. B. Rathbun.

The effect of flying in this machine is similar to a glider, when starting from a high mountain.

It Was a Very Narrow Escape For Ralph

RALPH VOORHIS must carry a flock of horseshoes and rabbits' feet with him. He is a daring young parachutist whose name is well known in connection with his rare ability to beat the "grim reaper". Recently he received his greatest thrill when, after leaping from a plane 2,000 feet in the air, neither of his parachutes functioned. Yet he is still alive and jumping.

Ralph Voorhis with his pack, ready for another jump.

Just before dusk, on the evening of May 31, 1931, Voorhis stepped out of a plane over a crowded airport. He fell free for 1,000 feet and pulled the rip-cord. When he pulled, he was in a head-down position, and the silk canopy, playing out between his legs, caught in the hooks of his high-lace shoes. After falling a few hundred feet more the silk finally freed itself from the jumper.

Unfortunately, several shroud lines now wrapped themselves around the 'chute, allowing it to open about a quarter of its normal diameter. Both jumper and 'chute were spinning downward at a terrific rate. At this point, realizing his danger, Voorhis pulled his emergency 'chute. He was spinning so rapidly that the emergency 'chute spun itself around Voorhis' legs before it could free itself.

Here was a sight to make one sick at heart. The crowds on that airport gasped in horror as they watched this unfortunate lad falling to certain death.

But luck was with him again. After narrowly missing the corner of a barn, Voorhis landed on his side in a deep furrow made by a plow. His body made a depression in the ground, several inches deep. From all this falling, he received only a broken arch, a broken arm, and severe cuts and bruises on the side and head.

Five weeks later, Voorhis repacked his own chutes and jumped them successfully a few days later.

Aerial Fire Alarm

PILOT G. E. (SLIM) THOMAS lives in East Point, Ga., near Candler Field. He flies between Atlanta and Miami with the night airmail for Eastern Air Transport.

On a recent morning, this pilot was finishing up his run, nearing the Atlanta terminus and tired after long hours of lonesomeness aloft with only love letters and business mail for company. In a few minutes he would be within sight of his home—then the field—then rest.

Suddenly his heart jumped. He could see the spot where his home should be, but a glaring red blaze was there—a building on fire! He stared for a moment, then thrust his throttle wide open and pointed the nose of his heavily loaded mail plane downward.

With screaming wires and a roaring motor, he flashed over the burning house. Back he came and circled the building, no higher than its blazing roof. For a few minutes he created a tremendous uproar, saw people rush from the building and then he flew on to Candler Field and landed.

It was not his house that was afire, but that of a neighbor, W. Harvey Jones. The Jones family did not know who the pilot was or where he came from at 2 A. M., but they reported to fire department officials that they had been soundly sleeping when the noise of the plane awakened them to their danger.

A Truck Size Wheel

THE wheel shown in the accompanying photograph belongs to a Sikorsky Amphibion—not a motor truck. For those of you who have not had the opportunity of examining these huge amphibions at close range, the relative size of the wheels and its constructor—Igor Sikorsky—will give an idea of its tremendous weight.

Showing, by comparison, the large wheels and tires necessary for these amphibions. Igor Sikorsky stands at the left.

What I Think About Committee Investigations

by CAPT. CHAS. W. PURCELL

A few remarks on airline crack-ups, suggested safety measures and foolish investigations.

THROUGHOUT the country and especially during this last winter, we have lost some of our finest air pilots, with the result that some of our leading newspapers and civic organizations have come to the conclusion that something must be wrong with aviation. It has finally entered into the heads of the laymen that something is wrong with the aviation industry.

It seems to take about three years to get an idea of this kind into the laymen's heads, but this time they are on the right track. Something is, and has been for the past several years, wrong with aviation. Investigations are being started here and there which are all well and good, but these said investigations will all end up in the same way. An investigation right now into the policies of certain air lines by the *proper people* would be one of the best things that could happen to the aviation industry at large, but if you hold your breath and wait for these "investigators" to investigate, you'll probably die of strangulation.

Chambers of Commerce and several civic bodies are delving into the aviation question here and there throughout the country, but they will all end up against the same brick wall, and that "wall" is the refusal of the pilots to enter into the investigation.

Why?

That word immediately comes into the reader's mind. Well, here's the answer in plain English. Any pilot appearing at one of these investigations and giving helpful information would be immediately fired—if not sooner. There are several dozen reasons why they could be fired, at least they could be made to appear legitimate, and one of these could be used as an excuse to get rid of a talkative pilot. The one thing they would probably use would be weather.

This word means nothing to the layman or non-flyer, but in the flying game when given as a reason for a man's discharge, it means that he has refused to fly on account of weather conditions. In plain English it means the pilot is yellow, and as our air line pilots are anything but that, the answer is any one of a dozen things. Amongst them is the refusal of a pilot to attend any "investigation".

He thoroughly understands how these are conducted. He knows they start with a grand dinner and speeches by the local half-wits, he knows these same half-wits are then taken to the local airport for a view of the country from the air, he knows that at the airport they contact several dozen almost-pilots whose total flying time might be one hundred hours. He knows some local business men will pose at the field for the local papers with several of the "pilots" in the background, and that's that.

This illustrates a new 'chute pack for passenger ships, which, the Captain claims, and with good reason, is totally ineffective.

No, not quite that, either. I forgot to mention that the investigation usually ends with a big banquet given by the local interests and attended by the managers of the airlines in question. Many speeches, lots of hand-clapping, and several tons of "white-wash", and the investigation is complete.

Regarded as a big party and hurrah, the investigation is a complete success, that is, if the grub is up to standard, but as an investigation—it's the bunk. Why make a picnic out of a serious job?

THE total result is a lot of free publicity for several dozen business men and the air game remains "as was". This is the reason why a pilot who has any brains will stay as far away from these things as he can get, and most of them would like to be so far away that it would cost $1.50 to send in a post-card.

One of these "investigating committees" wanted air lines to furnish each passenger with a parachute. Of all the fool ideas that the laymen have tried to place on the back of aviation, this is the world's greatest. A little investigating on your own hook among pilots will satisfy you that this parachute idea is wetter than prohibition—and that's all wet.

In the first place, who is going to tell a pilot that he is going to crack-up on a mountain top while flying through fog. If he knew this was to happen, one crack-up would have to go some place else if it wanted publicity. For the sake of argument, the author will admit that the pilot knew that he was about to commit suicide and decided to tell the passengers about it. Let's just imagine what would happen.

Pilot sends co-pilot back to tell all the passengers to "bail out". Co-pilot rushes into the passengers' cabin and yells these "two little words". They are no sooner out of his mouth than several of the passengers pass out cold—faint, in other words. Out of ten passengers there might be five in a dead faint, and two corpses among the balance. That leaves three of them still on their feet, but not quite sure about these "contraptions".

The co-pilot finally fastens on the 'chutes and then tries to shove them out the door, that is, IF he can get the door open. We'll give in and say the door has a patented "dingus" that will allow it to open. Can you imagine an average co-pilot trying to push a couple of big butter and egg men through the door when there are a lot of seats they can grab and hold on to? Can you imagine these same passengers going into a frenzy and trying to murder that co-pilot? This doesn't take much imagination.

Again we'll give in and say he gets the passengers out of the cabin. Who will tell these passengers when they are clear of the ship so that they can pull the ring? If they pull too soon, the 'chute will tangle up in the ship and then it's just too bad for Mr. Passenger. More than likely the passenger will "pass out" when he is pushed out, and then what good is the 'chute? Listen, gentle reader, let this soak into your head. *You'll never get the majority of the passengers of any transport plane to jump a 'chute pack,* and you can dunk your doughnuts in that. And that's for parachutes.

Ideas have been flying around airports for some time, regarding ways and means of stopping these many crack-ups, and I'm going to hand out my two-bits' worth into the general mix-up. First I want to tell you a little something of the misery in the life of an airline pilot when he flies passengers or mail.

He reports to the field and the first thing he does is to read the weather report of the route he is about to fly. Only parts of the field may be visible through the drizzling night rain, but

the local storm is just so much bunk as far as he is concerned. His interests lie along his run. It is easy to get off a field in any kind of weather, but getting back on—ah, that's a different story. If the end of his run is all open and clear, a pilot worries not about the condition of his home port.

When he reads the weather report and finds a zero ceiling in the vicinity of the field on which he is to finally land, that is not so hot. A zero ceiling, for the benefit of the uninitiated, means that the visibility is nix. In other words, the fog or rain is thick from the grass roots right up to—well, —your guess is as good as mine.

It may run well into the thousands of feet and if the height of the storm is greater than the ceiling of the ship, in other words the highest his ship can climb, then it's just too bad for Mr. Pilot. He can't come down safely while flying through this "soup" and he can't go up because of the lack of ceiling of his ship, so he flies (if he's a good blind flyer) until his gas gives out or until he bumps a mountain peak.

Our pilot looks at the weather report further and finds storms all along his route, and decides that the flight should not be made. He goes into the traffic manager and so reports. This pilot has probably put in two to four thousand hours of flying over this particular air route and knows every mountain and valley on the course. The reader would judge that this pilot's decisions should be worth something. Is it? Not by your stars and garters. The manager says, "Well, so-and-so, if you don't want to make the run we'll get one of the co-pilots to do it; he'll take it out."

Now you ask, can the manager get a youngster to make the trip? Sure he can; just the same as you can hire a man to jump from the Brooklyn Bridge for fifty dollars. Some of our large airlines today are working our youngsters against our old timers. The reader must not forget that youth is always looking for a chance to be able to say that he flew a ship when an old-timer refused to take it out. Ninety-nine times out of a hundred the youngster will be washed out, and the passengers if any, will be buried along with him.

The pilot knows this. He understands fully that one of the kids will make the hop if he doesn't and he feels that if anyone can get through, he can. He climbs into the ship and away he goes. The minute his ship leaves the ground, the dark of the night wraps itself around him. The ground quickly blots out and just the rolling mists and the roar of his motor are there to keep him company.

THE instruments in the cock-pit are his only friends now. He adjusts his radio, looks over the side. He sees nothing, not even the motor on the nose of the ship. The wings are hidden in the clouds of fog that roll by

(*Continued on page* 327)

American Pilot Shot Down by Japanese

Robert Short flying the Boeing Pursuit plane in which he was later shot down by a Japanese pilot.

Robert Short who gave his services to the Chinese government as pilot, probably in search of adventure.

THE American pilot, Robert Short, attached to the Chinese Air Forces, was shot down over Soochow, being instantly killed when the ship crashed. The plane, shown in the accompanying photograph, was a single-seater Boeing pursuit plane.

Robert Short, unfortunately, is typical of many other Americans who have taken part in the Oriental air wars, another prominent American being Bert Hall, the hero of a recent story in POPULAR AVIATION. This job of soldiering in foreign legions is very exciting and a temptation to men with a daring spirit, but the question is—does it pay?

The Bellanca Flying Palace "Miss Fidelity"

THIS characteristic Bellanca plane, "Miss Fidelity," was built for a private owner at a cost of $45,000. It is powered with a Wright "Cyclone" engine rated at 600 h.p.

Particular notice should be paid to the streamlining of the exterior wing bracing, a part of which undoubtedly functions as a lifting surface. It is interesting to trace this sort of wing arrangement back to Alexander Graham Bell's "tetrahedral kites", and to the invention of a still earlier American inventor that has recently been brought to our attention.

Note the peculiar arrangement of the external bracing used on the "Miss Fidelity". This reduces the resistance and at the same time contributes to the lift.

Details of the New Guiberson Diesel Engine

This latest addition to Diesel aviation engines has many original features. Operating on cheap fuel oil, it is highly economical in service.

AVIATION'S first "Free Wheeling" airplane engine is a new oil burning radial type, incorporating original features which assure complete flexibility of operation.

Employing the old principle of compression ignition developed by Dr. Rudolph Diesel, modern aeronautical technicians claim that the Guiberson motor performance surpasses the standard gasoline engine. It displays flexibility never before considered possible in an oil burning unit also an extremely high factor of economy and an unusually high factor of safety.

Advancing on the theory that the oil burning motor was the most practical development in aeronautical progress, S. A. Guiberson, Jr. investigated the possibilities of conversion of the Diesel principle into a compact, high speed power unit.

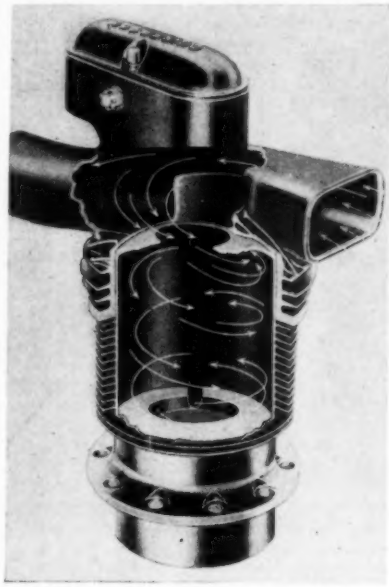
In a design of variable control and constant pressure, worked out by Fred Thaheld, an Austrian aeronautical engineer, he found what he believed to be the most advanced conception of the Diesel principle as adapted to aviation requirements.

Early in 1929, Thaheld, with C. S. Crickmer, chief engineer of the Guiberson organization, work began on the first engine. The test model kicked off on its initial spin and ran with almost perfect precision.

After a thorough workout of the engine, a number of refinements of design were later incorporated, and in November, 1931, the official test run of the motor was completed by government engineers in the Department of Commerce laboratories at Washington.

This motor was rated at 185 h.p. and awarded A.T.C. No. 79.

Early in 1932, the company perfected a 240 h.p. Diesel motor, following the design of the 185 h.p. unit. This will go to Washington for its official test immediately after the Detroit show.



A phantom view of the cylinder showing the internal circulation of the air forced in through the entry port and valve seat.

The Thaheld design completely revolutionizes the control of the Diesel powered motor, retaining, however, the sturdy, reliable performance inherent with the big, oil burning, stationary machines that have been in use for some time.

Unlike the mammoth stationary Diesels, which must be run at a fixed number of revolutions per minute to develop their greatest efficiency, the Guiberson motor is so constructed as to operate at peak efficiency, whether idling or wide open.

Weight, heretofore one of the serious factors which precluded the use of Diesels in aeronautical work, has been reduced in the Guiberson engine to the level of standard gasoline motors without sacrificing either performance or safety.

The 185 h.p. engine has a total weight of 510 pounds, or 2¾ pounds per h.p. The 240 h.p. motor weighs a total of 540 pounds, or 2¼ pounds per h.p., which approximates the weight of the most efficient gasoline engine of the same rating.

To prove the performance and reliability of the engine, Colonel Art Goebel, flew an airplane powered with the Guiberson Diesel from Dallas to Detroit and return in April 1931. The fuel cost for this trip, a distance of

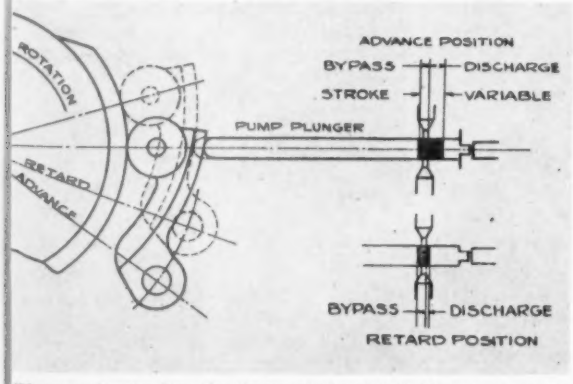
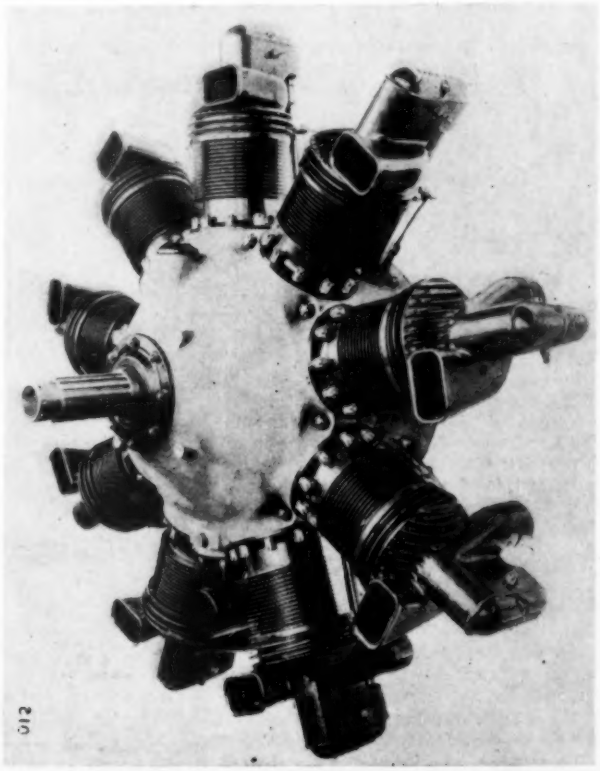


Diagram showing how the timing of the oil injection pump can be advanced or retarded like the ignition of a gasoline engine, by shifting the cam-follower.



The Guiberson 9-cylinder radial Diesel engine develops 185 h.p. and weighs only 510 pounds. Note the cylinder ports opening into the propeller slip-stream.

only five minutes before it leaves. The pilot gets his orders from the dispatcher before leaving and a complete weather report covering all stops on his route.

When the plane is ready to take-off, an attendant runs out on the field with two flags, one white and one red. He holds the red one in the air until he is sure that the plane is in no danger from other craft. If the sky is clear he gives the signal with the white flag, and in a minute the big ship is in the air.

Planes come and go with such regularity that one almost tires of watching them, but the dispatcher never tires. Day or night, when he hears the hum of a plane, he turns or goes out of the office, just to see how it lands. Even though one has seen over a hundred thousand landings and take-offs, the fascination still holds. It is still a novel sight to the human race.

AN EXCITING part of the dispatcher's work is in warning planes of sudden and unforeseen storms. Not long ago there was a squall near Valley Stream which seemed to come right up out of the sea. It was so unexpected, and of such violent strength, that it might have been a hazard for passenger ships.

The dispatcher got in touch with the pilots of all incoming planes and in ten minutes every one of them was on the ground at an emergency field.

Even a plane on the ground can get in touch with the home office or any other radio station equipped for receiving their calls. One time a pilot on a southern route was forced down in a field by an air bubble in his fuel line. When he landed, after a rather bumpy ride over broken ground and stubble, he began to cuss, forgetting that his radio was on. He did so with such enthusiasm that reports came all the way from the Pacific Coast of his picturesque profanity.

In the dispatcher's room, a plane bound west, just outside of Cleveland came on the air. The pilot was calling Cleveland without being able to raise the dispatcher at that field.

"There's a blind spot there," said the Valley Stream dispatcher as he adjusted his instrument.

"4973, 4973, Valley Stream calling, Valley Stream calling. I'll relay you to Cleveland."

IMMEDIATELY the pilot gave his position, the Valley Stream dispatcher signed him off and called Cleveland, repeating his message. From Cleveland came an immediate acknowledgment, and then the words, "Albany, Newark, Buffalo," came over the air as the dispatchers at those stations also indicated they had heard.

The repetition of the names of other fields follows after practically every meessage, showing that all along the line dispatchers are listening in for any indications of trouble. No greater assurance of the care with which flying is conducted could be given than by a visit to one of these dispatching offices.

Diminutive Plane Beats Record

At right, we see the "G-Abre" after landing in Sydney, Australia. Note the method of mounting the wing, a rather unusual method.

Below, we see the little ship taking off at a rather steep angle of climb. Note the very deep fuselage used here.

THE "G-Abre" is considered the smallest practicable plane in the world. The pilot, C. A. Butler, holds the smallest pilot record.

The two of them, the smallest pilot and the smallest plane, recently flew from Heston Airdrome, England, to Sydney, Australia, clipping an hour off the previous record. The flight was made in nine days, one hour, and thirty-two minutes.

One of the photos shows the ship in flight, just after the take-off. The other shows them shortly after landing at Sydney.

While the deep fuselage may be a protection to the occupants of this plane, yet it must interfere with the vision.

Falls, But Without Danger to Passengers

M. SAUVANT, a former French naval aviator, believes he has invented a plane with which it is possible to fall from great heights without danger to the passengers. Animals and fragile articles have been dropped in test-planes with complete success.

The safety feature is based on the use of several shells to form the cabin, and together with a system of bumpers to absorb the shock.

Recently he planned an experiment to prove that human beings were perfectly safe. Somehow the police are not in favor of such experiments, and prevented the attempt.

View of the French cushioned plane that is claimed smash-proof.

Famous Planes of the World War

Here we have a view of the well known Junkers J-4, a ship of which you have frequently heard. It has a characteristic spindle shaped body with the cylinders above the body in a separate compartment.

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The "Million Dollar Fire" at Combey where discarded ships were heaped into one big bonfire and burned—just one more example of the appalling waste of war. The insignia on the wings indicate German as well as Allied ships.

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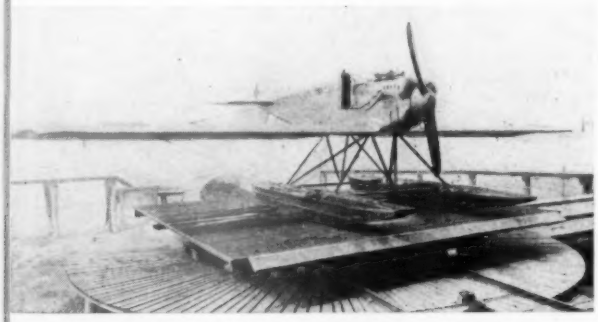

Another Dornier, this time it is a low wing monoplane seaplane with two pontoons. This would appear to be the most practicable of all the wartime Dornier seaplanes as it incorporated many of the ideas now considered modern.

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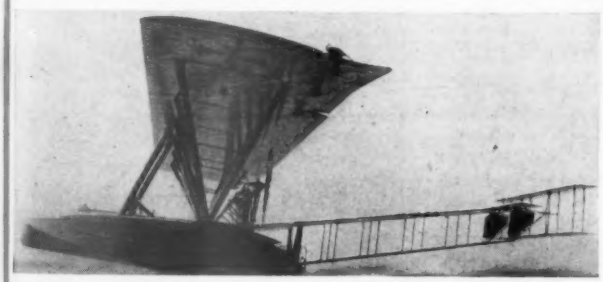
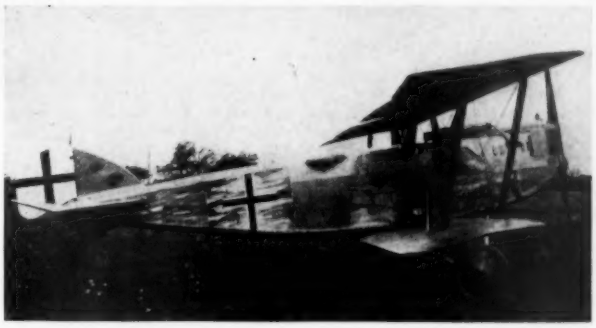


An early Dornier flying boat with the tail group mounted on a long open trussed type outrigger. This, in our opinion, was only one reason why this type disappeared permanently. It could not resist the action of sea water.

WHILE we have printed pictures of many German wartime planes in previous issues, yet this is the first time that we have shown German seaplanes. Photos of these seaplanes are quite rare, therefore we trust that this page will be a valuable contribution to your album.



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A Dornier type R-S-4 seaplane. A peculiar design with the engine and pilot's nacelle located between the pontoons and the upper fuselage. The latter was evidently for the accommodation of officers.

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Is this a German Roland? Yes, this is a Roland according to history. It is evident that its designer admired the "Spad" from the appearance of the fuselage and from the setting of the wing cells.

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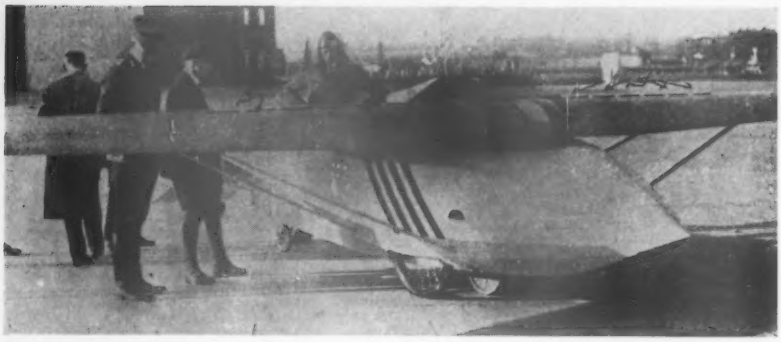
A German Propellerless Airplane



Here we are looking at the rear of a recent type Canard plane, driven by air forced through the slots (S) in the wings.

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Ralph Voorhis with his pack, ready for another jump.

Just before dusk, on the evening of May 31, 1931, Voorhis stepped out of a plane over a crowded airport. He fell free for 1,000 feet and pulled the rip-cord. When he pulled, he was in a head-down position, and the silk canopy, playing out between his legs, caught in the hooks of his high-lace shoes. After falling a few hundred feet more the silk finally freed itself from the jumper.

Unfortunately, several shroud lines now wrapped themselves around the 'chute, allowing it to open about a quarter of its normal diameter. Both jumper and 'chute were spinning downward at a terrific rate. At this point, realizing his danger, Voorhis pulled his emergency 'chute. He was spinning so rapidly that the emergency 'chute spun itself around Voorhis' legs before it could free itself.

Here was a sight to make one sick at heart. The crowds on that airport gasped in horror as they watched this unfortunate lad falling to certain death.

But luck was with him again. After narrowly missing the corner of a barn, Voorhis landed on his side in a deep furrow made by a plow. His body made a depression in the ground, several inches deep. From all this falling, he received only a broken arch, a broken arm, and severe cuts and bruises on the side and head.

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Aerial Fire Alarm

PILOT G. E. (SLIM) THOMAS lives in East Point, Ga., near Candler Field. He flies between Atlanta and Miami with the night airmail for Eastern Air Transport.

On a recent morning, this pilot was finishing up his run, nearing the Atlanta terminus and tired after long hours of lonesomeness aloft with only love letters and business mail for company. In a few minutes he would be within sight of his home—then the field—then rest.

Suddenly his heart jumped. He could see the spot where his home should be, but a glaring red blaze was there—a building on fire! He stared for a moment, then thrust his throttle wide open and pointed the nose of his heavily loaded mail plane downward.

With screaming wires and a roaring motor, he flashed over the burning house. Back he came and circled the building, no higher than its blazing roof. For a few minutes he created a tremendous uproar, saw people rush from the building and then he flew on to Candler Field and landed.

It was not his house that was afire, but that of a neighbor, W. Harvey Jones. The Jones family did not know who the pilot was or where he came from at 2 A. M., but they reported to fire department officials that they had been soundly sleeping when the noise of the plane awakened them to their danger.

A Truck Size Wheel

THE wheel shown in the accompanying photograph belongs to a Sikorsky Amphibion—not a motor truck. For those of you who have not had the opportunity of examining these huge amphibions at close range, the relative size of the wheels and its constructor—Igor Sikorsky—will give an idea of its tremendous weight.

Showing, by comparison, the large wheels and tires necessary for these amphibions. Igor Sikorsky stands at the left.

XUM

What I Think About Committee Investigations

by CAPT. CHAS. W. PURCELL

A few remarks on airline crack-ups, suggested safety measures and foolish investigations.

THROUGHOUT the country and especially during this last winter, we have lost some of our finest air pilots, with the result that some of our leading newspapers and civic organizations have come to the conclusion that something must be wrong with aviation. It has finally entered into the heads of the laymen that something is wrong with the aviation industry.

It seems to take about three years to get an idea of this kind into the laymen's heads, but this time they are on the right track. Something is, and has been for the past several years, wrong with aviation. Investigations are being started here and there which are all well and good, but these said investigations will all end up in the same way. An investigation right now into the policies of certain air lines by the *proper people* would be one of the best things that could happen to the aviation industry at large, but if you hold your breath and wait for these "investigators" to investigate, you'll probably die of strangulation.

Chambers of Commerce and several civic bodies are delving into the aviation question here and there throughout the country, but they will all end up against the same brick wall, and that "wall" is the refusal of the pilots to enter into the investigation.

Why?

That word immediately comes into the reader's mind. Well, here's the answer in plain English. Any pilot appearing at one of these investigations and giving helpful information would be immediately fired—if not sooner. There are several dozen reasons why they could be fired, at least they could be made to appear legitimate, and one of these could be used as an excuse to get rid of a talkative pilot. The one thing they would probably use would be weather.

This word means nothing to the layman or non-flyer, but in the flying game when given as a reason for a man's discharge, it means that he has refused to fly on account of weather conditions. In plain English it means the pilot is yellow, and as our air line pilots are anything but that, the answer is any one of a dozen things. Amongst them is the refusal of a pilot to attend any "investigation".

He thoroughly understands how these are conducted. He knows they start with a grand dinner and speeches by the local half-wits, he knows these same half-wits are then taken to the local airport for a view of the country from the air, he knows that at the airport they contact several dozen almost-pilots whose total flying time might be one hundred hours. He knows some local business men will pose at the field for the local papers with several of the "pilots" in the background, and that's that.

This illustrates a new 'chute pack for passenger ships, which, the Captain claims, and with good reason, is totally ineffective.

No, not quite that, either. I forgot to mention that the investigation usually ends with a big banquet given by the local interests and attended by the managers of the airlines in question. Many speeches, lots of handclapping, and several tons of "whitewash", and the investigation is complete.

Regarded as a big party and hurrah, the investigation is a complete success, that is, if the grub is up to standard, but as an investigation—it's the bunk. Why make a picnic out of a serious job?

THE total result is a lot of free publicity for several dozen business men and the air game remains "as was". This is the reason why a pilot who has any brains will stay as far away from these things as he can get, and most of them would like to be so far away that it would cost $1.50 to send in a post-card.

One of these "investigating committees" wanted air lines to furnish each passenger with a parachute. Of all the fool ideas that the laymen have tried to place on the back of aviation, this is the world's greatest. A little investigating on your own hook among pilots will satisfy you that this parachute idea is wetter than prohibition—and that's all wet.

In the first place, who is going to tell a pilot that he is going to crack-up on a mountain top while flying through fog. If he knew this was to happen, one crack-up would have to go some place else if it wanted publicity. For the sake of argument, the author will admit that the pilot knew that he was about to commit suicide and decided to tell the passengers about it. Let's just imagine what would happen.

Pilot sends co-pilot back to tell all the passengers to "bail out". Co-pilot rushes into the passengers' cabin and yells these "two little words". They are no sooner out of his mouth than several of the passengers pass out cold—faint, in other words. Out of ten passengers there might be five in a dead faint, and two corpses among the balance. That leaves three of them still on their feet, but not quite sure about these "contraptions".

The co-pilot finally fastens on the 'chutes and then tries to shove them out the door, that is, IF he can get the door open. We'll give in and say the door has a patented "dingus" that will allow it to open. Can you imagine an average co-pilot trying to push a couple of big butter and egg men through the door when there are a lot of seats they can grab and hold on to? Can you imagine these same passengers going into a frenzy and trying to murder that co-pilot? This doesn't take much imagination.

Again we'll give in and say he gets the passengers out of the cabin. Who will tell these passengers when they are clear of the ship so that they can pull the ring? If they pull too soon, the 'chute will tangle up in the ship and then it's just too bad for Mr. Passenger. More than likely the passenger will "pass out" when he is pushed out, and then what good is the 'chute? Listen, gentle reader, let this soak into your head. *You'll never get the majority of the passengers of any transport plane to jump a 'chute pack*, and you can dunk your doughnuts in that. And that's for parachutes.

Ideas have been flying around airports for some time, regarding ways and means of stopping these many crack-ups, and I'm going to hand out my two-bits' worth into the general mix-up. First I want to tell you a little something of the misery in the life of an airline pilot when he flies passengers or mail.

He reports to the field and the first thing he does is to read the weather report of the route he is about to fly. Only parts of the field may be visible through the drizzling night rain, but

the local storm is just so much bunk as far as he is concerned. His interests lie along his run. It is easy to get off a field in any kind of weather, but getting back on—ah, that's a different story. If the end of his run is all open and clear, a pilot worries not about the condition of his home port.

When he reads the weather report and finds a zero ceiling in the vicinity of the field on which he is to finally land, that is not so hot. A zero ceiling, for the benefit of the uninitiated, means that the visibility is nix. In other words, the fog or rain is thick from the grass roots right up to—well, —your guess is as good as mine.

It may run well into the thousands of feet and if the height of the storm is greater than the ceiling of the ship, in other words the highest his ship can climb, then it's just too bad for Mr. Pilot. He can't come down safely while flying through this "soup" and he can't go up because of the lack of ceiling of his ship, so he flies (if he's a good blind flyer) until his gas gives out or until he bumps a mountain peak.

Our pilot looks at the weather report further and finds storms all along his route, and decides that the flight should not be made. He goes into the traffic manager and so reports. This pilot has probably put in two to four thousand hours of flying over this particular air route and knows every mountain and valley on the course. The reader would judge that this pilot's decisions should be worth something. Is it? Not by your stars and garters. The manager says, "Well, so-and-so, if you don't want to make the run we'll get one of the co-pilots to do it; he'll take it out."

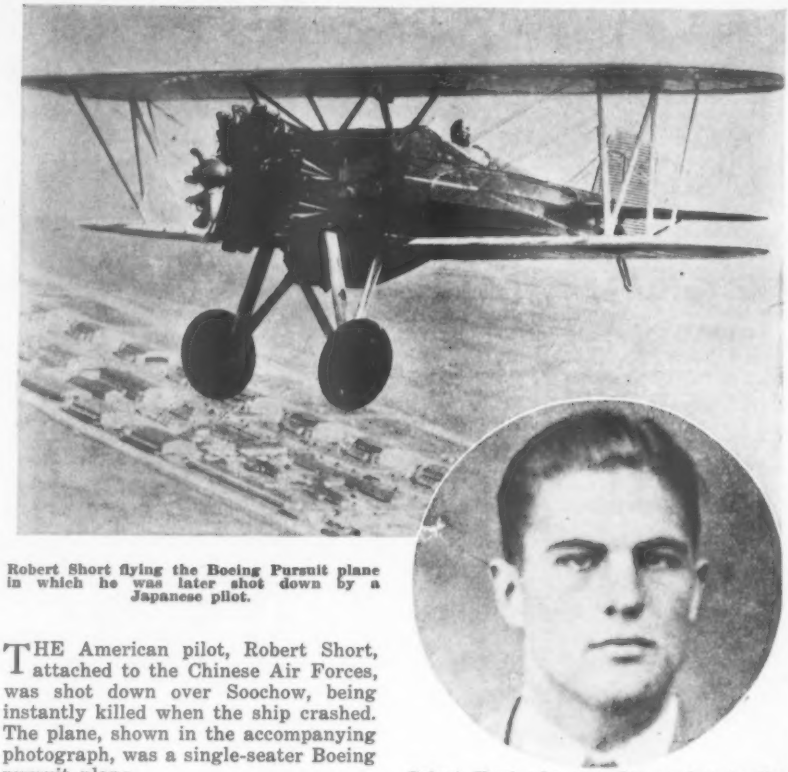
Now you ask, can the manager get a youngster to make the trip? Sure he can; just the same as you can hire a man to jump from the Brooklyn Bridge for fifty dollars. Some of our large airlines today are working our youngsters against our old timers. The reader must not forget that youth is always looking for a chance to be able to say that he flew a ship when an old-timer refused to take it out. Ninety-nine times out of a hundred the youngster will be washed out, and the passengers if any, will be buried along with him.

The pilot knows this. He understands fully that one of the kids will make the hop if he doesn't and he feels that if anyone can get through, he can. He climbs into the ship and away he goes. The minute his ship leaves the ground, the dark of the night wraps itself around him. The ground quickly blots out and just the rolling mists and the roar of his motor are there to keep him company.

THE instruments in the cock-pit are his only friends now. He adjusts his radio, looks over the side. He sees nothing, not even the motor on the nose of the ship. The wings are hidden in the clouds of fog that roll by

(*Continued on page* 327)

American Pilot Shot Down by Japanese



Robert Short flying the Boeing Pursuit plane in which he was later shot down by a Japanese pilot.

Robert Short who gave his services to the Chinese government as pilot, probably in search of adventure.

THE American pilot, Robert Short, attached to the Chinese Air Forces, was shot down over Soochow, being instantly killed when the ship crashed. The plane, shown in the accompanying photograph, was a single-seater Boeing pursuit plane.

Robert Short, unfortunately, is typical of many other Americans who have taken part in the Oriental air wars, another prominent American being Bert Hall, the hero of a recent story in POPULAR AVIATION. This job of soldiering in foreign legions is very exciting and a temptation to men with a daring spirit, but the question is—does it pay?

The Bellanca Flying Palace "Miss Fidelity"

THIS characteristic Bellanca plane, "Miss Fidelity," was built for a private owner at a cost of $45,000. It is powered with a Wright "Cyclone" engine rated at 600 h.p.

Particular notice should be paid to the streamlining of the exterior wing bracing, a part of which undoubtedly functions as a lifting surface. It is interesting to trace this sort of wing arrangement back to Alexander Graham Bell's "tetrahedral kites", and to the invention of a still earlier American inventor that has recently been brought to our attention.

Note the peculiar arrangement of the external bracing used on the "Miss Fidelity". This reduces the resistance and at the same time contributes to the lift.

Details of the New Guiberson Diesel Engine

This latest addition to Diesel aviation engines has many original features. Operating on cheap fuel oil, it is highly economical in service.

AVIATION'S first "Free Wheeling" airplane engine is a new oil burning radial type, incorporating original features which assure complete flexibility of operation.

Employing the old principle of compression ignition developed by Dr. Rudolph Diesel, modern aeronautical technicians claim that the Guiberson motor performance surpasses the standard gasoline engine. It displays flexibility never before considered possible in an oil burning unit also an extremely high factor of economy and an unusually high factor of safety.

Advancing on the theory that the oil burning motor was the most practical development in aeronautical progress, S. A. Guiberson, Jr. investigated the possibilities of conversion of the Diesel principle into a compact, high speed power unit.

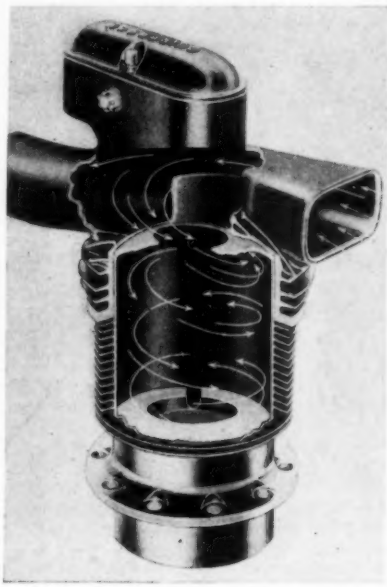
In a design of variable control and constant pressure, worked out by Fred Thaheld, an Austrian aeronautical engineer, he found what he believed to be the most advanced conception of the Diesel principle as adapted to aviation requirements.

Early in 1929, Thaheld, with C. S. Crickmer, chief engineer of the Guiberson organization, work began on the first engine. The test model kicked off on its initial spin and ran with almost perfect precision.

After a thorough workout of the engine, a number of refinements of design were later incorporated, and in November, 1931, the official test run of the motor was completed by government engineers in the Department of Commerce laboratories at Washington.

This motor was rated at 185 h.p. and awarded A.T.C. No. 79.

Early in 1932, the company perfected a 240 h.p. Diesel motor, following the design of the 185 h.p. unit. This will go to Washington for its official test immediately after the Detroit show.



A phantom view of the cylinder showing the internal circulation of the air forced in through the entry port and valve seat.

The Thaheld design completely revolutionizes the control of the Diesel powered motor, retaining, however, the sturdy, reliable performance inherent with the big, oil burning, stationary machines that have been in use for some time.

Unlike the mammoth stationary Diesels, which must be run at a fixed number of revolutions per minute to develop their greatest efficiency, the Guiberson motor is so constructed as to operate at peak efficiency, whether idling or wide open.

Weight, heretofore one of the serious factors which precluded the use of Diesels in aeronautical work, has been reduced in the Guiberson engine to the level of standard gasoline motors without sacrificing either performance or safety.

The 185 h.p. engine has a total weight of 510 pounds, or 2¾ pounds per h.p. The 240 h.p. motor weighs a total of 540 pounds, or 2¼ pounds per h.p., which approximates the weight of the most efficient gasoline engine of the same rating.

To prove the performance and reliability of the engine, Colonel Art Goebel, flew an airplane powered with the Guiberson Diesel from Dallas to Detroit and return in April 1931. The fuel cost for this trip, a distance of

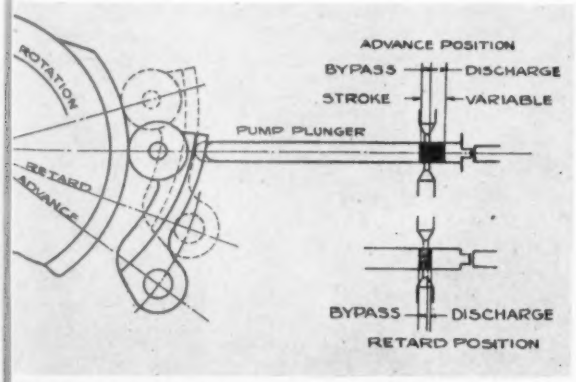
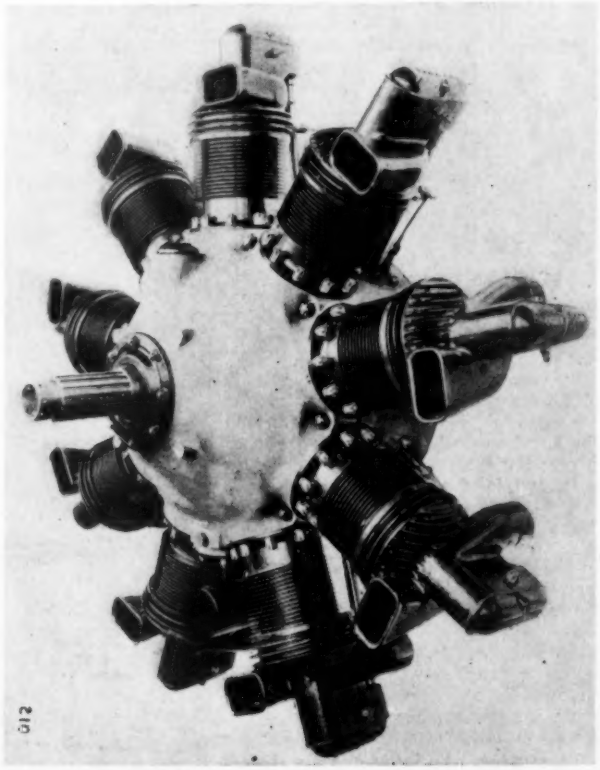
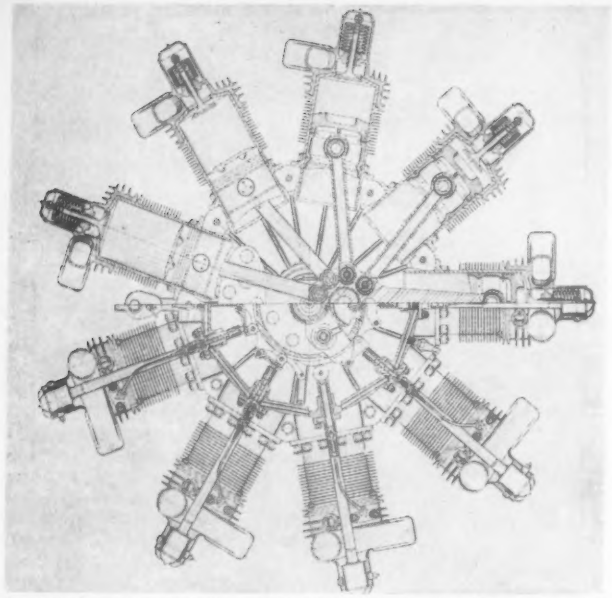


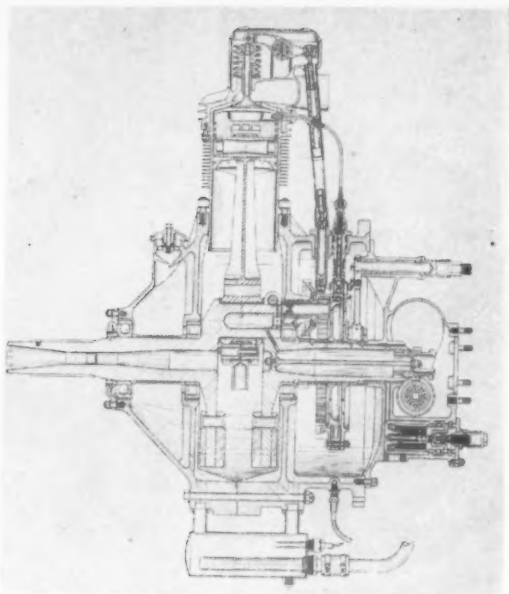
Diagram showing how the timing of the oil injection pump can be advanced or retarded like the ignition of a gasoline engine, by shifting the cam-follower.



The Guiberson 9-cylinder radial Diesel engine develops 185 h.p. and weighs only 510 pounds. Note the cylinder ports opening into the propeller slip-stream.



Front half-section of Guiberson Diesel engine showing the single valve and connecting rod connections. Note piston head construction.



Longitudinal section showing valve gear, crankshaft and crankcase arrangement. Note the cam arrangement.

about 2,400 miles, was less than one cent a mile.

The ceiling of the Guiberson Diesel motor has not as yet been determined. Recently, Col. Goebel flew this same ship, equipped with the Diesel motor and carrying 300 pounds excess weight, to a height of 21,686 feet. This is nearly 5,000 feet above the ceiling of the same ship equipped with a gasoline engine. The flyer did not carry oxygen with him and had to descend when he reached that altitude because he had reached his own personal ceiling.

Col. Goebel said that at 15,000 feet he set the throttle at 1,850 r.p.m. At 21,686 feet the engine had accelerated itself to 2,050 r.p.m. and was running perfectly. In Goebel's opinion, the engine would have carried the plane to a greater height.

The basic patent of Mr. Thaheld's design relates to the variable fuel control system. This patented control of the Guiberson Diesel engine is simplicity personified in its construction and operation.

By means of one control, the stroke of the pump is varied when the time of the injection is advanced or retarded. The duration of the injection is changed in proportion to the amount of fuel injected while the time of injection is varied by moving the control to the extreme position below idling.

The motor compression is released by the decompression ring, attached to the main control plate which, allow the propeller to turn freely. This accomplishes, through decompression, the "free wheeling" which allows the propeller to turn freely in a glide with the motor dead, and to start the motor again from a normal gliding angle with merely an advance of the throttle.

This "free wheeling" feature is of vital importance in facilitating the inspection and servicing of the motor. It is also a safety factor. Should the operator run out of fuel, and have to resort to his reserve supply, he can run up the motor again to full power through the simple operation of the throttle control.

The valve-cam is mounted in the conventional manner on the crankshaft in the rear case and is driven by an intermediate gear opposite to crankshaft rotation at one-eighth crankshaft speed. The four valve-lobes are exceptionally long for the valve action is somewhat different from the standard practice. Only one valve is used for the scavenging and intake stroke. Therefore, the valve-lobe must hold the valve open for a period of 440 degrees of crank travel.

Detail of the fuel injection system with cam, timing device, oil pump and injection nozzle (at top). Oil is drawn into pump through the inclined lines at side.

The fuel-cam is integral with the valve-cam and also has four lobes which are so spaced as to give the proper time of injection.

Following the fuel-cam path are nine pump-levers, each lever having a roller on the outer end that rides the face of the cam. These pump levers are mounted between the main control plate and decompression ring, controlling the pump stroke over the advance range when the main control plate is moved opposite to the rotation of the cam.

This position is toward maximum advance and maximum stroke. To retard the injection, and thus shorten the stroke, it is only necessary to move the control-plate with the pump-lever in rotation with the cam. The injection starts at 48 degrees B.T.C. and ends 25 degrees B.T.C. with a duration of 23 degrees. This setting has a pump plunger velocity of 24.7" per second and the duration of the injection occurs in .00207 second at 1925 r.p.m.

At the idling setting of .015", the lift of the plunger starts at 11 degrees B.T.C. and ends 2 degrees A.T.C., a duration of 13 degrees at 400 r.p.m. in .00542 seconds.

This readily shows the variable timing of the fuel injection, and makes it possible to a large extent to control the maximum cylinder pressures.

The decompression ring, controlled in a unit with the control plate, rides between the fuel and valve-cam. It has nine small lobes that engage each

(*Continued on page* 334)

Answers to Official Mechanic's Exam

Answers to the sample questions issued by the Department of Commerce, Aeronautics Branch, for the examinations leading to a mechanic's license.

PART I

EDITOR'S NOTE! Before publishing the answers to the exam questions, they were submitted to, and approved by, a local inspector of the Department of Commerce.

Q. How often must a licensed airplane be inspected? By whom?

A. 1. Within seven days preceding flight, and once every 25 flying hours.

A. 2. By a licensed airman.

Q. What lights must be carried on a 'plane carrying passengers for hire at night?

A. Navigation lights, electric landing lights and parachute flares.

Q. What entries are required in the airplane and engine log of a licensed airplane?

A. Repairs and damages must be entered, the line inspection (25 hour) notes and the notes of the periodic inspection after 100 hours of operation.

Q. May an unlicensed mechanic work on a licensed airplane?

A. Yes, if he is working under the direction of a licensed mechanic.

Q. May a licensed mechanic work on an unlicensed airplane?

A. Yes.

Q. What experience is necessary to be eligible for an engine mechanic's license?

A. Two years' experience with internal combustion engines, one year of which must have been devoted to the maintenance of aircraft engines.

Q. What experience is necessary to be eligible for an airplane mechanic's license?

A. One year's experience in building, maintaining or repairing aircraft.

Q. What report must be submitted to the Department of Commerce after an accident to a licensed airplane?

A. After a serious accident, the owner shall telephone or telegraph the Secretary of Commerce, giving the license number or identification number of the ship, the time and place of the accident. All accidents shall be reported immediately on a form provided for that purpose.

Q. If you fail on this examination, how long must you wait before reapplying?

A. Ninety days from the time of the examination.

Q. How long does a mechanic's license remain in force?

A. Two years from date of issue.

Q. What is necessary to renew it?

A. Will be renewed for additional two year periods upon proof that the holder has rendered services under his license for at least half of the term, and may be required to undergo further theoretical and practical tests.

Q. Give five reasons for the suspension or revocation of a mechanic's license.

A. For violating act of 1926. For carelessness or inattention to duty; demonstration of incompetency; under influence of liquor; refusal to show license.

A licensed mechanic giving an engine the periodic examination required by law.

Q. Where should the log book of a licensed airplane be kept?

A. On the airplane, when away from its home airport.

Q. What special equipment must be in a plane making a trip over water?

A. A compass, Very's pistol and life preservers, together with drinking water and food.

Q. How often is a line inspection required on a licensed airplane?

A. At least once in the seven days preceding flight and at least one inspection every 25 hours of flying time, except for scheduled air line operation which requires daily line inspection.

Q. Must a licensed engine mechanic be experienced in the maintenance of ignition systems?

A. Yes.

Q. Name eight items that are included in a daily line inspection.

A. Landing gear, fuselage parts open to inspection, external bracing of main wings, wires, cables, control surface fabric, cowling, cooling system, exhaust manifold.

Q. Are safety belts required on both closed and open cockpit airplanes?

A. Yes.

Q. What would be the meaning of a license reading: R3046?

A. Restricted for industrial operation or for racing.

Q. Is a compass ever required on a licensed airplane?

A. Yes, when a flight is made over water and out of sight of land, or cross-country more than 100 miles.

Q. What is the age requirement for mechanic's license?

A. Minimum age is 18 years.

Q. What engine instruments are required on a licensed airplane?

A. Tachometer, altimeter, oil pressure gauge, water or oil thermometer, depending on whether water or air-cooled engines are used.

Q. What safety equipment is required on licensed aircraft carrying passengers for hire?

A. Fire extinguishers, first-aid kits, safety-belts.

Q. May a licensed mechanic ride in the co-pilot's seat?

A. Yes, but he may not manipulate the controls unless he holds the proper pilot's license.

Q. What civil penalty may be imposed for a violation of the terms of an airman's certificate?

A. A civil penalty of $500.

Q. What are the markings for licensed aircraft?

A. A letter must precede the numerals on licensed craft. "S" for government craft, "C" for all commercially licensed craft except gliders, "G" for gliders, "N" for craft operating beyond limits of the United States. Special licenses are issued for special purposes: R—industrial, X—experimental.

Q. What requirements must be met before carrying passengers for hire in an airplane which has been seriously damaged?

A. Shall not be flown until repaired in accordance with regulation (31) nor until the repairs have been approved by a Dept. of Commerce inspector.

Q. When must a mechanic carry his license?

A. When serving with licensed aircraft.

Q. May a citizen of a foreign country hold a mechanic's license?

A. Yes.

Q. Must an applicant for mechanic's license be able to read, write, and speak the English language before receiving a license?

A. Yes.

Q. Is anyone other than a licensed mechanic authorized to sign the log book of a licensed airplane?

A. Yes, any licensed airman making a daily line inspection.

Q. How do you tell the difference between a licensed and an unlicensed airplane?

A. A letter precedes the numerals on a licensed plane, while only numerals are used on a registered plane.

Q. What are the sizes of the letters and numbers required on the wings of an airplane?

(*Continued on page* 326)

JUNIOR ACTIVITIES
Edited by Paul W. Clough

Edward Whitney, the youngest transport pilot, poses for the press photographer.

We recently heard from Woodrow W. Slatzer, 18, of Marion, Ohio, who has designed, built, and had licensed by the U. S. Department of Commerce, Aeronautics Branch, a new two place Sail Plane. This is the first of its type to be built and to be licensed.

The new Sail Plane has license number C823Y. It is a high wing monoplane, has open cockpit, dual controls, and split type landing gear with air wheels. The plane also has a large aspect ratio and a large gliding angle.

Slater has studied aeronautics and aeronautical engineering since he was twelve years old and can explain or talk aeronautical terms understandingly. He has an average of 97½ in drafting and 95 in higher mathematics.

Woodrow expects to become an engineer in the U. S. Army Research Aeronautical Department as well as a test pilot.

At the National Air Races last September he met Capt. Frank Hawks and Col. Eddie Rickenbacker.

Next summer he wants to try to establish some new Junior Airplane records. We all wish you lots of luck with your sail plane and your future plans in Junior aviation.

* * *

Edward Forest Whitney, 18, of Leominster, Mass., recently received his transport license. Edward has had about 500 hours since his 16th birthday.

Edward received his transport pilot's license at the minimum age limit allowed by the Department of Commerce, which is 18.

* * *

Harry Bauman of Brooklyn, N. Y., writes that the glider that he, George Carrado and George Egner, are building is nearly completed. They have been working on it for the past few months.

The Department of Commerce has issued license No. 988M for the craft.

* * *

Edward Forrest Whitney, Leominster, Mass., is believed to be the youngest transport pilot in the United States.

He has just passed his 18th birthday, and as a result of his previous experience and ability, was awarded his license after passing the tests. During the last two years he has had about 500 hours in the air. Congratulations, Ed.

* * *

Miss Pretto Bell seems happy.

Miss Pretto Bell is perfectly able to fly, but because of the regulations she must wait two years. The regulations say that a pilot must be sixteen years old, and Miss Bell is only fourteen.

She is taking a trip to the Hawaiian Islands to help pass the time for the next two years.

* * *

Ralph Clandon, 18, of Chicago, has soloed on his own homebuilt lightplane after receiving dual on a standard O. C. commercial trainer. After 15 hours dual at the school, he went home and flew solo from Chicago to Waukegan without mishap.

* * *

The Second Long Distance Light Plane Flight

(*See Opposite Page*)

AS a preliminary trip, before attempting a trans-Atlantic flight from the United States to Poland, K. W. Kunau is planning a lightplane flight from North to South America and return in an Alexander Flyabout.

The flight will take about two months and will include flying over sixteen countries. From Denver, where the flight will begin, the itinerary will include El Paso, Chihuahua, Torreon, Mexico City, San Salvador, Mangua, Punterenas, Panama City, Bogota (the highest city in the Western Hemisphere), Lima, Antofagasta, Santiago, Buenos Aires and Rio de Janeiro.

Including the various side trips that will be made for photographic purposes, Mr. Kunau believes that the flight will cover at least 10,000 miles.

The flight will be the second longest flight by lightplane. A similar trip was recently completed, after a flight of 23,000 miles around Africa. No flight of similar length has so far been attempted in this country.

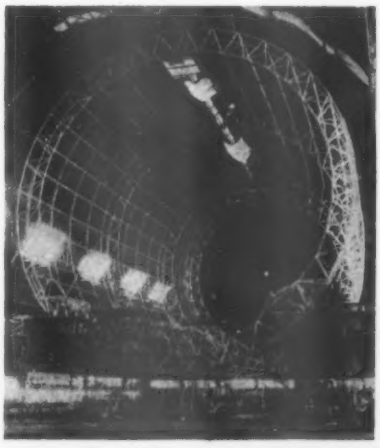
The Sister Ship to the Akron Develops Steadily

FOUR of the Transverse rings of the duralumin skeleton of the ZRS-5 are now in place.

The ZRS-5 ("Macon"), of course, is the sister ship to the U. S. S. Akron.

Work at the plant in Akron is progressing rapidly. Construction is expected to be completed the early part of next year.

Althought the ZRS-5 is a "sister ship" to the Akron, there will be many changes in detail. Improvements are being made in design from time to time, and these are being incorporated in the new ship. When completed, the ZRS-5 will be the finest lighter-than-air-craft in the world.



First section of the Macon's (ZRS-5) hull, erected, showing girth rings and longitudinal members of the structure on place.

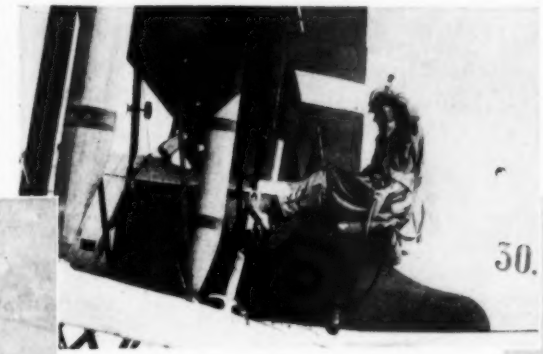
XUM

It's All In the Day's Work for Kunau

A Few Photographs from His Album.

The hair raising stunts on this page are a few samples of what an airplane acrobat must be ready to perform at all times for the entertainment of his spectators.

Mr. Kunau is now planning a Trans-Atlantic flight to his native country, Poland. The nerve that has been developed by these acrobatics will be put to good advantage in the flight.



Above: Before taking-off for the first parachute jump ever seen in Poland. Mr. Kunau has been largely instrumental in creating aviation interest in Poland.

•

Below: Walking the wing of a fast plane. Only a light rope prevents him from falling. Note that there is no parachute used. These stunts call for nothing short of cast iron nerve.

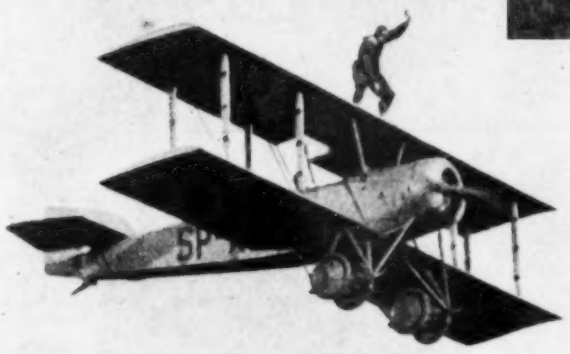
K. W. Kunau, the Polish flying acrobat. Using an Alexander Flyabout, he will soon fly to South America in the first long lightplane flight in the Western Hemisphere.

•

Above: A "different" position for viewing the landing field in Poland where he hopes to land next summer. Notice that he is hanging entirely by his feet. The hand grip has been thrown off to one side.

•

Below: Hanging by a ladder 3,000 feet in the air. Oil from the engine, falling on the ladder makes this stunt very hazardous, and has nearly cost Kunau his life.



Below: The first parachute landing in Poland. The start of this jump is seen at the top of the page. This jump was made to assist at a large charity event in May, 1929.

K. W. Kunau recently came to this country to promote the first non-stop flight from the United States to Poland. He will make a preliminary flight to South America in a lightplane. The flight to Poland is planned for the coming summer.

Glenn Curtiss Also Built a Tailless Plane

Rear View of the Curtiss tailless biplane that Glenn Curtiss constructed shortly before his death. Note the variable angle of incidence which washes out toward the tips.

THE last work of the late Glenn Curtiss was this tailless plane. It is designed for "flivver service". It cannot loop, spin nor dive and has a landing speed of only 19 miles per hour. The wing spread is 35 feet, and the power is derived from a three-cylinder engine. It was expected to sell at about $1,000. This airplane was never placed on the market.

Flying a Ship Below Sea Level in India

THE Imperial Airways England-India Service has just opened regular airplane service to the little town and harbor of Tiberias, on the Sea of Galilee. It is 700 feet below sea level, and now, for the first time, this community is brought into regular high-speed communication with the outside world.

An interesting sidelight is the fact that this is the lowest level at which aircraft are regularly operated anywhere in the world. Aeronautical experts say a flying machine should take-off more quickly with a heavy load and should make slightly higher speed several hundred feet below sea level than at normal height, because of the greater density of air.

Imperial Airways will make practical tests of this theory in its Tiberias schedule.

The "Jockey" — Fast British Warplane

THE Royal Air Force of Great Britain have recently adopted this new all-metal Vickers "Jockey" single seater, intercepter fighter. The armament consists of two machine guns. It is capable of flying at nearly four miles a minute at a height of seven miles above the ground.

To protect the pilot against extreme cold the cockpit is heated by electricity. A specially designed flying suit, also heated by electricity, is part of the equipment.

The illustration shows a side-on view of the plane.

The "Jockey" is a British single-seat pursuit type that reflects the present tendency toward monoplanes for military purposes.

Goodwill and the Public

WHAT makes air travel a pleasure? What makes the passenger think that one air-line is a bit better than another? All of them have available co-operation of the Department of Commerce and its numerous employes. But this is all behind-the-scenes stuff, not realized, or else just taken for granted by one who pays his or her fare.

Maybe it *is* the pilot who eases his ship in to a gradual landing, who seeks the least bumpy altitude, or who watches the bumps in the field when taxying, but ten to one it's the steward or hostess who impresses the passenger with the fact that the company is doing its best to please.

Little things like pointing out another plane coming through the clouds, locating your whereabouts on the route map or retrieving a dropped glove from the floor. Maybe it's the radio man at the home field who gives the pilot the dope on that bum patch of weather over the mountain pass that had been previously reported by the pilot of another transport, and so insures the passenger's safety.

The latter, however, gets a bigger kick out of the way the company's agent calls him at the hotel in the morning and reminds him that the bus will call for him in fifteen minutes or so to take him to the airport. The routine acts, like a lot of other things that go on back of the scenes, are little appreciated by the ones who benefit by them. It's the striking, unusual incident that "gets" the passenger and makes him write home to the folks about the great way this or that company is running their outfit.

Take the little trick down the San Joaquin Valley, the other day. The big trimotored job, en route to Bakersfield at the head of the valley, was scheduled to stop at Fresno to let off a couple living in that town. But this day Sunny California belied its name and the field at Fresno was blanketed with "wet wool".

Passenger pilots don't feel their way down through this stuff like the mail pilots sometimes do, so the big rudder-and-stick man notified his passengers that he would land them at Bakersfield. From there, he told them, they would be returned to Fresno, 105 miles away, by motor or rail.

He radioed his decision to the home office. There it was discovered that the plane would land at Bakersfield too late to permit the Fresnoites to return home the same day. Fresno was shut out, Bakersfield was too far away, but —Delano, 70 miles past Fresno, was open.

The operations manager got the airways radio operator to transmit an emergency message on the regular weather broadcast frequency to which the plane's set was always tuned.

"Delano is open, land there to discharge Fresno people", was the gist of the message to the pilot.

The public be pleased—by *some* companies.

Confessions of a Mexican Parachute Jumper

by ABRAHAM MURILLO, JR.

An interesting and entertaining letter from one of our Mexican readers in which he tells of thrilling personal experiences while 'chute jumping in his native land

Dear Editor:

THIS letter goes with all the good wishes of the bunch of Mexican parachute jumpers. We are hoping to see it printed against all odds, so I beg your pardon because I know but little about your language. Will you be kind enough to print it?

And here I go with the history. The first jump made in Mexico that I remember, was made some seven years ago by a fellow nick-named "the little German", and he was a German all right. He jumped from a plane piloted by Pablo Sidar, one of our leading aces. They went over our field at a height of 3,000 ft.

The little German got out of the cockpit all right, but he became nervous and pulled the ripcord just when he jumped. The parachute was caught at the tail skid and was teared to pieces so the German falled down at a terrific speed making a big hole when he landed.

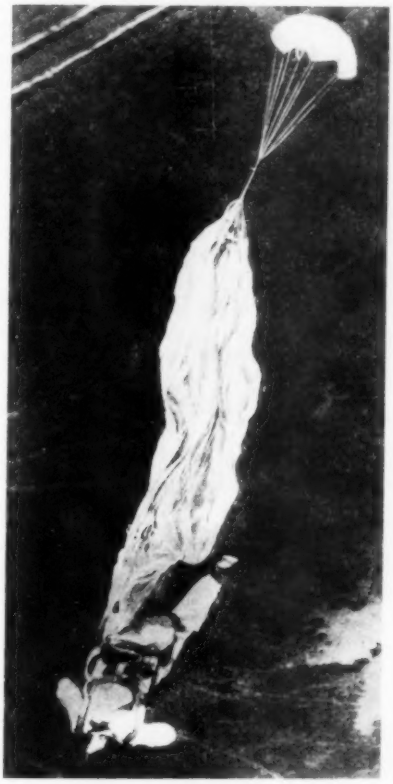
That, as you know, is a bad start in any country, so parachute jumping was regarded as a very dangerous thing. In the year of 1927, the Gov. buyed several Douglas war planes, and with them some Irvin 24 'chutes as a standard equipement. Then Col. Lezama (a graduated from Kelly and Mitchel fields) made two jumps hurting his ankles.

Then came the Dec. 1929 Air Show. There was at the Flying School a parachute instructor named Teodore C. Jimenez, a guy with a big heart and pretty sure of himself. He looked over us that were 'chute fans, and asked if we wanted to jump during the show.

We were all delighted and he began to give us some instructions in folding and packing chutes. So, when the show started, we were all ready to do it. They choosed the Douglas "14" with José Leon as pilot and a Mec. to do the stunt with all of us.

Have you jumped from the rear cockpit of a "Doug." with gun mountings and with full gun on? Boy! it's a very hard thing to do for the first time. Let me explain that Mexico City is 7,300 ft. over sea level, then, put 3,000 ft. more and then jump with a "24" seat pack 'chute from a "Doug."

Well, you know how it is done. First, lift yourself from the deep gunner's cockpit, then come down by the side of the fuselage—one foot on the wing's trailing edge and the other on the fuselage—one hand on the ripcord. The other hand is on the edge of the pilot's cockpit with the air-stream of the 420 h.p. engine trying to cut you loose from there.



U. S. Army Air Corps Photo

"During the whole show, some 12 boys and girls jumped and only one of them became insane because of a hard hit on the head."

Then, when you are over the field, the pilot just gives a look to be sure that all is well, making at the same time an upside slip—and down you go. Isn't it a glorious feeling to come down gently floating on the still air with no apparent suport after so much noise and trouble?

The show started on Dec. 9. I just watched the boys jump, and instead of getting confidence, I was scared stiff. On Dec. 13, a Friday, I was folding my chute a 24 ft. Russell seat pack. Nobody was due to jump that day, when I was more busy, a bunch of Lieut. pilots strolled in the place throwing flowers at the same time on the silk I was folding.

I looked at them in surprise, and they told me that this particular 'chute was thrown once from a plane with a dummy and it didn't open, so they expected to be at the funeral.

That made me mad enough, but they were all Lieuts. and I was only a sergeant then. When I finished packing my chute, the instructor rushed in the place, telling me that the Sub-Secretary of War was on the field and expected to see a jump!

Well, boys, not the Friday 13, nor the Lieuts.' jokes stoped me! So I went to the "Doug." 14, and after we made enough altiude, I made a wonderful jump, on a Friday 13 that held no "Jinx" for me. I was rewarded with a 20 dollar bill by the Sub. Sec. It was my first money earned on chute jumping.

DURING the whole show, some 12 boys and girls jumped and only one of them became insane on account of a hard hit on the head.

Then I lived one of the most frightful experiences of my life. We went to the dedication of an airport in the town of Toluca on March or April, 1930. There were many American press representatives, and if they read this, they sure will remember. This particular time we were four boys, now feeling like "veterans"—all with 24 ft. Irvin seat pack chutes.

Toluca is some 8,500 ft. or so over sea level and the air is thin and bumpy—too hard for a 24, isn't it? This time we all jumped at the same time from Douglas planes in close formation. I was in plane number 17. The pilot of the ship, Major Del Campo, was kind enough to cut his motor while I was coming out, so it was easier this time. I jumped all right, but was turning too fast in the air.

When I pulled the ripcord, I found myself badly entangled with the shroud lines, falling at a great speed head down and with the chute partialy opened. I fell in this fashion about 1,000 ft. and finally managed to pull myself out of the mesh, landing at last—hard but safe—in front of the stand.

One of the boys kissed so hard mother earth with his head, that he became insane for a period of a year. He is now all right but cured of 'chute jumping! We went then all over the country, jumping here and there, not with the slightest mishap until May, 1931.

We went to Puebla (a beautiful eastern city) to attend at the 4th Centennial of its foundation that was held there from May 1st to the 15th. There happened a extrange thing to one of our jumpers, Carlos Paullada. I doubt if a simmilar case was happened, or would happen again in any part of the world.

We took to the air in seven Douglas planes in close formation. Five of the boys jumped all right and landed safely in the field below and with each of us went a mec. that was supposed to help

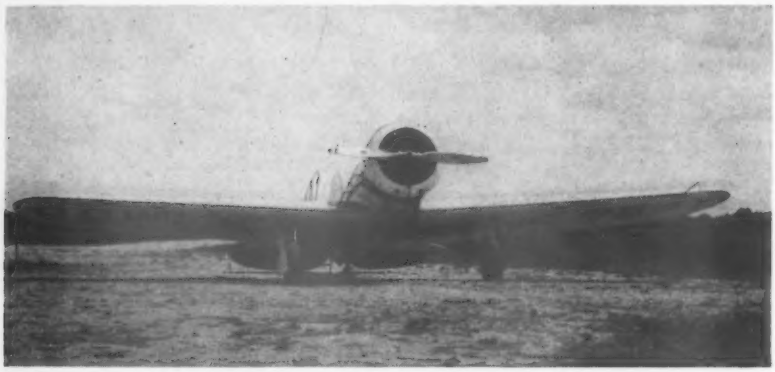
(*Continued from page* 329)

Editor's Note.—This letter has been left in its original form, without editing, in order to preserve the shades of humor and meaning intended by the author.

Two Opposing Views on t

Cord is in the Wrong—"Safety Disregarded"

[redacted] Says
C. H. THOMAS
Former Senior Pilot, Century Air Lines.



The Lockheed Orion—a modern transport plane. "Securing a transport license. . . . does not alone give the qualifications for securing a post as pilot on any of the recognized air lines."

LITTLE did we know when Century Air Lines came into existence during March of last year that before the passing of twelve months it would be the center of discussion in air commerce. And little did we suspect that we would be the cause of that controversy.

When the pilots went to work for Century Air Lines, it was at the organization of the new line. We agreed to a flat salary of $350.00 a month, which was approximately half of what pilots were getting on other air lines in this country for the same work. With that flat salary of $350.00, we were also promised other inducements.

One of the promises was a bonus based on a merit system base on how well we would do our work; a bonus ranging from fifty dollars to one hundred dollars a month.

This bonus system, however, was never put into effect, but we, knowing that there were details involved in the operations and instituting of an air line, felt it was having its due consideration.

Nothing was heard regarding this bonus until we all received a letter which constituted a compromise, and instead of the bonus based on the merit system, we were to get twenty-five dollars a month longevity increase based on six month periods.

At the end of the first six months the pilots received twenty-five dollars, and we should have received another increase this March.

So we went along on a twenty-five dollar increase up to January 23, 1932, when we received a letter saying that effective February 1, 1932, our wages would be based on three dollars an hour for day flying and five dollars an hour night flying with the guarantee of $150.00 a month.

The pilots decided that the best thing to do was to have a meeting with officials of the air line. We gathered, had meetings in various cities and sent two or three letters requesting a meeting with officials of the Century Air Lines. We received no answers to these letters.

We then appointed a committee and a chairman to have a talk with Mr. Cord. At first he refused to speak with anyone, but finally he agreed to talk to our chairman. This interview lasted five and a half hours, with no result. Then a committee consisting of five men conversed with Mr. Cord. They had no result from the arbitration nor any understanding.

E. L. Cord, President of the Century Air Lines and center of the Wage Controversy with his ex-pilots.

It finally ended up with our immediate employer, Mr. William Bliss, retracting his letter advising of the reduction. It was a gentleman's ten-day agreement wherein we were to work on our old scale until we could reach some understanding. At some time during this ten-day period it was understood that we would have a meeting with the Cord officials and any salary that we decided upon was to be retroactive to the first of February.

There was no meeting held during this ten-day period and on the morning of February 9 the pilots went to work, were met at the doors of the hangars and refused admittance. Before this lock-out and during this gentlemen's agreement, it came to our notice that the Century Air Lines were checking pilots at the Municipal Airport by the Stinson Factory Test Pilot. But none of the pilots checked were hired until after the lock-out.

Following the lock-out, the Federal Government, through the Labor Department, attempted to have the matter arbitrated by presenting Mr. B. Marshman for conference. Mr. Cord did not answer to this attempt at cooperation.

The methods used by the Century Air Lines in the protection of their property and the propaganda being broadcast had a tendency toward intimidating the pilot personnel they were bringing in to take our places. We as experienced air line pilots knew better than anybody else the mental instability that will result from these conditions. There was absolutely no reason for them to place armed guards, nor tell their pilots not to be alone at night for fear of being beaten up.

One of the most stringent air line requirements is that of mental alertness. A clear head for thinking fast and a memory which is just short of being infallible. It is an acknowledged fact in all walks of life that a person's ability is very much hindered by worry and fear.

It was immediately evident that the Century Air Lines, operating under strike breaking conditions, were doing so with a disregard to safety. Air-line flying is a highly specialized field of aeronautics, and the Air Line Pilots' Association, of which we are all members, enforces the rule that a first-class pilot can only come to that rating by first serving as a co-pilot to acquire the necessary experience.

In this wage controversy the Century Air Lines have based their requirements on the rulings of the Department of Commerce, which were

(*Continued on page 327*

on the Century Wage Controversy

Cord is in the Right—"Business Is Business"

Says

LOIS F. BEARD,

Commercial Plane Operator

"The pilots will get a lot further doing their job of piloting and letting the operator do the business end of operations."

Dear Editor:

AS a regular reader of POPULAR AVIATION and after reading your "Open Letter" to the Century Air Lines, I cannot help but disagree with you in several points.

First of all, let me declare myself. I am in no way connected with the Century Air Lines or any other air line operator, and I most certainly do not hold any briefs for Century or any other company. Only the interest of "fair controversy" prompts me to write these lines.

Your article in this month's POPULAR AVIATION in my opinion is unjust to the Century, inasmuch as you do not present both sides of the controversy; I have before me a statement from Mr. E. L. Cord, president of Century Air Lines, which I suppose was sent to all transport pilots.

This statement to me is very clear. Rather than to close up the lines and thereby throw more pilots out of employment, they found it necessary to reduce expenses! just the same as in all other lines of business.

You speak of lowering the standard of pilots. That is the same as telling the Department of Commerce that they are "all wet" in the manner that they now grade pilots. The Department when it grants a "transport license" has conferred upon the pilot the highest grade of license issued by them!

Then, on top of this, do not the Air Lines state that they will not consider an application for employment unless the applicant has at least five hundred hours! You speak of "Full Transport Pilots"—full of what? This is a new one on me. You also speak of the $4,000 to $7,000 investment which these pilots have spent to enable them to earn a decent living! That is o. k. as far as it goes, but it does not go far enough.

Business is business, regardless of what kind of business it may be. Take your own publication, for instance. Suppose that your company was not making a profit, and you had tried every way that you could think of to increase your business, but due to economic conditions you found it impossible to show a profit. What else would or could you do but make every cut in operation expenses possible to avoid a deficit or close up shop?

Now, your men are just as valuable to you as they ever were, but you haven't got the business. You tell all your employees that you will have to "cut wages". They start howling, and what's more, they tell the whole world about it, spreading a lot of unnecessary propaganda.

Then a lot of other interests start telling you how you should run your business! What would your reaction

The lives of these passengers are entirely in the hands of the pilot. What is your answer?

to this be? I would tell those outsiders to mind their own d—— business.

I most surely want to see the pilots get all they can, but my idea is, and always has been, that a half a loaf is better than none at all, particularly at this time when conditions are far from normal. I have a business, with about $10,000 invested with two airplanes, which are not included in the above amount. One is a Waco, and the other is a five passenger Ryan Transport. Also, an A. & E. mechanic's license, a wife and two children.

I have been interested in aviation since 1918, and, believe it or not, $200 to $300 a month wouldn't look half bad to me, especially where I had no personal investment. Sure, I have made a lot more than this, we all have, but it wouldn't be so hard to look at under the present conditions.

There are plenty of other transport pilots that are wondering where the next meal is coming from, and this amount would look very nice to them. To some, this will sound like "strike breaking", but such is not the fact—it's cold turkey.

Based on the old law of supply and demand, there are about six times as many transport pilots as there are transport jobs. You also speak of inexperienced pilots hired by Century as "third raters". Just how you have classified us?

I sure fail to understand. The United States Government has given us the highest grade of license and calls us "Transports", and still I am a third rater because I would take a job guaranteeing me $150.00 per month even if I did no flying! RATS . . . and DOUBLE RATS. The pilots will get a lot further doing their job of piloting and letting the operator do the business end of operations.

The greatest trouble today seems to be that the employee is trying to run the business instead of the boss; Intelligence—you sure said it. If the employees had the intelligence and the ability, the present bosses would be working for them! When a person in any line of business thinks that the world can't get along without them, they should take a trip out to some graveyard and look around—there are plenty there! And still the world goes

(*Continued on page* 327)

WOMEN'S ACTIVITIES
Edited by Lady Mary Heath

Nellie Thurston Squire, who was famous back in the days, when balloonists held the place now occupied by stunt fliers, died at Prospect, New York, on February 6. She had hundreds of balloon ascensions to her credit, and was called the most daring woman balloonist of all time. Her real name was Nellie Moss. She was born May 13, 1846.

Lady Mary Heath.

* * *

Mrs. Edna H. Christofferson of Portland, Ore., the widow of Silas Christofferson, a famous pilot of the days when aircraft were crates of bamboo, and who was killed in a crash 13 years ago, has left with William H. Graham, a veteran airpilot of Alaska, on a flight to locate an abandoned Hudson Bay company fur ship, said to be laden with valuable furs. The ship was caught last fall in ice drifts in the Arctic and was left by the crew.

Mrs. Christofferson is one of the most colorful women pilots in the United States. She maintains a private airport, operates an X-ray laboratory and technical department, and has won trophies as the finest woman marksman in the United States.

* * *

Margaret Gilmartin, pilot and nurse of 146 West 104th Street, New York City, believes that there is a future for flying nurses. Miss Gilmartin is soliciting members and funds for the American Nurses' Aviation Service, to train nurses for duties aboard aircraft. She believes that nurses are yet too busy thinking of themselves, and often airsick, to be much use to a sick person who is being rushed to a hospital by air.

The next war, says Miss Gilmartin, will require nurses who can nurse as they fly, and the services of nurses qualified for service aloft will be increasingly in demand in peace, as more and more ambulance service is required of airplanes.

* * *

As a result of the success of Eastern Air Transport's experiment of using women for air hostesses, other work for women in aviation has opened up. The traffic departments of several airlines have placed young women, and some aviation companies have placed women in charge of convention work. The women have called on delegates to conventions and induced many to take the air route to convention cities. Several women are traffic managers and others are in various executive positions.

* * *

A brother of Ruth Nichols is among the recent graduates of the advanced flying school at Kelly Field, San Antonio, Texas. Erickson Nichols received his wings the latter part of February.

* * *

Laura Morgan of 1111 Park Avenue, New York, led the way ahead of three other women fliers, and fourteen of the fifteen men, in an air derby from the Curtiss-Wright airport at Valley Stream, to Atlantic City on Washington's Birthday. She finished second only to Samuel Osterman of New York, who flew the 105 air miles in 1 hour 6 minutes and 40 seconds. Miss Morgan's time was 1 hour 10 minutes, 5 seconds.

The other women fliers were Mrs. Laura Harney, of Mount Vernon, New York, Mrs. John Remey and Miss Laurel Sharpless of New York City. All finished well up among the 19 fliers. This is the third derby in which Miss Morgan has won second honors.

Awards for contests recently held at the Valley Stream airport were made at a dinner at Atlantic City later. Mrs. Harney received a cup as winner of a spot landing contest. An award for bomb dropping was also announced as going to Mrs. Fleurdelys Scherr of Brooklyn, who was unable to take part in the derby. Mrs. Remey was on the committee that arranged the race.

* * *

Fräulein Marga von Etzdorf took off from Hongkong on February 29 on the first lap of her flight back to Berlin, which she left last August 18 on a trip to Japan. Fräulein von Etzdorf flew to Hanoi, French Indo-China, on her first hop from Hongkong.

* * *

Claiborne Foster, the actress, who has appeared in many leading roles in Broadway plays, was secretly married in February to Maxwell Jay Rice, manager of the Brazilian division of the Pan-American Airways. Mr. and Mrs. Rice left Miami by plane for Rio de Janeiro. It was Miss Foster's first trip in a plane, and was about 6,000 miles long.

* * *

The Vicomte de Sibour and his wife, a daughter of Gordon Selfridge, the American merchant, were reported missing in East Africa on March 11. The de Sibours at that time had been unreported since February 26, when they left Dakar for Naingwe in Belgian Congo. It is believed that they are probably down in some remote spot unharmed, but unable to communicate for the time being.

Photo Fans Club

WE have had quite a few letters from readers about this new department. It seems to be going over in a big way. Only one or two people have asked what it is all about. For the benefit of those who do not already know, the club is a medium whereby collectors of aviation pictures can get together for swapping or selling pictures to improve their present collections. Each month we publish new names and the material the fellows are interested in.

Here is the list of recent additions to the roll:

Howard B. Wilkinson, La Roque, Preston Road, Yeovil, Somerset, England, has a collection of aviation photos and post-cards. He has many for exchange.

Roy Lee Edwards, R. R. 5, Box 89-D, Bakersfield, Calif., is interested in starting a collection. It is suggested that you write to find out just exactly what he wants. He will probably want to buy one.

John C. Wyatt, 1920 Belmont St., Bellaire, Ohio, has quite a collection of war plane and modern plane photos. Also a few war relics, etc. He will trade for all kinds of airplane photos. "All letters answered promptly."

Grahame Duce, 2102 Mount Royal Terrace, Baltimore, Md., is specializing in World War photos. He is very anxious to improve his collection.

Judah Drab, 2331 Grand Concourse, New York, N. J., has a very interesting collection of pictures. He is another fan that is interested in the older pictures. In addition to the photos, he has quite a collection of drawings and descriptions of planes. From his letter we believe that he has a very interesting collection.

Ace Rikenbacker, Jr., 906 North Heritage Street, Kinston, North Carolina, is interested in trading pictures of commercial planes for army planes. He is especially interested in an actual photograph of a Boeing P-12-B. His pictures are all 9 in. by 12 in.

Frederick J. Clarke, 1171 St. Catharine St., W., Montreal, Quebec, Canada, is interested in war plane photos. He will also swap non-flying models for pictures.

Mr. Clarke suggests a seal for the Club which may be put into use later on.

Correction:— Some friends of Clair Smith, of Gap, Pa., have been spoofing the editor and Mr. Smith, by entering his name in the club without his knowledge. Mr. Smith's name is hereby withdrawn from the roster and Mr. Smith's prankish friends are herewith chastened.

There is one thing the editors of this magazine would like to know. Is there any other Photo Fan Club in the United States? We believe this is the only one. Are we correct?

Question and Answer Department

FOR the information of our new readers, we wish to state that this department is at their service and ready to answer any question on the subject of aviation that they may wish to present. This service, of course, is rendered without charge.

However, it is obvious that such questions must be of such a nature that they will be of interest to our other readers and not of a purely personal character. Further, we beg to be excused from giving advice on inventions and patents, for this matter can only be handled by a competent patent attorney. Outside of these two restrictions, anything goes so long as it relates specifically to the subject of aviation.

Address your queries to the Question and Answer Department, POPULAR AVIATION, 608 S. Dearborn St., Chicago, Ill. Write distinctly, giving your full name and address.

* * *

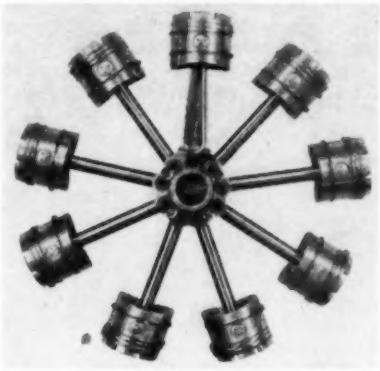
QUESTION:—Harold King, Muskegon, Mich. *Is the English gallon exactly the same as the United States gallon? In other words, is a gallon of gasoline sold in England exactly the same gallon measure or volume of a gallon sold in the United States?*

ANSWER:—NO, the English gallon is the larger. The English Imperial gallon contains 277 cubic inches, while the United States Standard gallon contains only 231 cubic inches. This difference often accounts for the apparent better mileage per gallon reported in English contests. Out of every gallon of gasoline burned, the Englishman still has 46 cubic inches remaining after the American has completely burned his gallon.

* * *

QUESTION:—Fred Lutte, Jr., Denver, Colo. *Do floating ailerons have any advantage over the ailerons built into the trailing edge of the wings? It would seem to me that they would add resistance and increase the power.*

All questions of general interest on any phase of aviation will be answered authoritatively by Popular Aviation's Technical Staff.



Pistons and connecting rods of a radial engine.

ANSWER:—INTERPLANE ailerons, or the so-called "floating ailerons", have a decided advantage when the ship is near the stalling point, for the floating type remain effective and exerts an appreciable righting effect after the built-in type become totally ineffective. This is an important safety measure. However, they do add resistance when in neutral, but when pulled down or up, they often indicate less resistance than the built-in wing type.

* * *

QUESTION:—Jack Apperson, Paterson, N. J. *Kindly show the construction of the connecting rods used in a radial engine, indicating the means by which they are connected to the crankshaft. It is difficult for me to see just how so many connecting rods can be accommodated on a single crankshaft without making the crankpin much longer than it appears to be.*

ANSWER:—THE accompanying illustration shows the assembly of the connecting rods used in a radial type engine. The connecting rods, nine in all, do not connect directly to the crankshaft in the ordinary manner, but are attached to a ring.

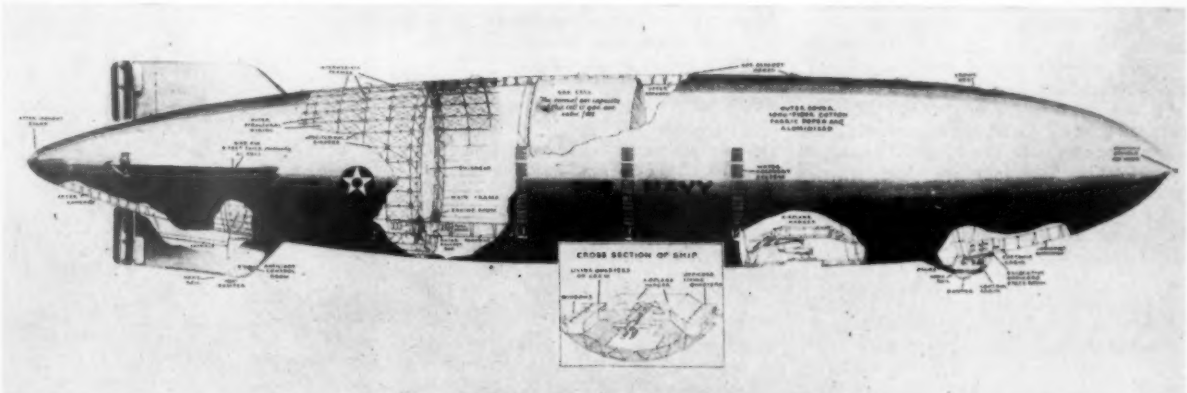
This ring fits around the crankpin in the usual manner, and the upper half of the ring forms one piece with one of the rods known as the "master rod". In short, the ring and this master rod, together, are just like an ordinary connecting rod, the ring corresponding to the "big end" of a standard type connecting rod.

Now, all around the ring are clevises and pins for the attachment of the remaining eight connecting rods, these rods being pinned to the ring so that they can rock back and forth at different points in the revolution of the crankpin. The rigid connection of the master rod prevents the ring from turning with the crank and aligns the pins for the remaining rods.

* * *

QUESTION:—Anthony Krum, Atlanta, Ga. *What is the difference between a rigid and a non-rigid airship? I have heard that the Akron is a rigid type, but do not understand where this rigidity applies. It would seem to me that all dirigibles would need to be rigid to withstand the winds and air pressures.*

ANSWER:—TO begin with, a non-rigid airship consists of an elongated gas filled envelope called the "hull". The fabric is stretched taut by the gas inside of it, and this stressed fabric is the only support that the gas carrying member contains. It is therefore evident that a ship of this kind cannot be driven at high speed without danger of "buckling" with the wind pressure, for as soon as the outside wind pressure approximates the internal gas



Part sectional view of the dirigible U. S. S. "Akron", showing the principal structural members, the ballonet and other important parts of the ship. This is a "rigid" type airship in which structural members are used for stiffening the hull.

pressure, there is little tension in the fabric.

A rigid dirigible, on the other hand, consists of a wood or metal frame, shaped to the outline of the dirigible's hull. The outer surface of the hull is then protected with a covering or envelope that is simply for the protection of the interior parts and therefore need not be gas tight. The greatest care is taken to shape the hull to streamline form in order to avoid excessive air resistance while the ship is being driven forward.

Inside the frame are a series of independent gas bags known as "ballonets" that are attached to the rigid frame. The ballonets are filled with hydrogen or helium gas, and being independent of one another, there is no danger of the ship collapsing should one of the ballonets become punctured or injured in other ways.

This construction is shown in detail in the accompanying view of the Akron where the outer fabric is torn away for a distance along the hull for the purpose of showing the ballonets and the structural members of the frame.

* * *

QUESTION:—J. J. D., Sacramento, Cal. *What effect has the propeller of a tractor type plane upon the lift of the wings? Does this increase or diminish the lift of the wings materially? Would it be possible to lift an airplane by means of propellers arranged along the front edge of the wings?*

ANSWER:—IF the slipstream delivered by the propeller were a steady column of air, without rotation, then the slipstream would produce a lifting force within its disc area, always providing that the wings were tilted at the proper angle of incidence.

As a matter of fact, it has been possible to lift models off the ground without any forward motion by distributing the props along the leading edge of the wing. So far as we know, however, this idea has not been applied to full size machines.

However, in practice, the slipstream of the propeller does not remain stationary, but rotates in the direction of the propeller. This action necessarily forces air down on the top of one wing and up against the bottom of the other wing so that the best results are not possible under such conditions. Blowing the stream down on top of one wing destroys, or at least partially destroys, the lift of that wing. The same rotation slightly increases the lift of the other wing. The total net result is a loss in lift when the lift is computed on the basis of the slip-stream velocity.

* * *

QUESTION:—Albert T. Friedland, Cleveland, Ohio. *How is the lift of a wing computed? Is there a rule that takes the kind of wing section, the size of the wing, the speed and similar factors into account? If the rule is complicated, it is not necessary to give it completely, as I only wish to get a general idea of how the calculation is carried out.*

ANSWER:—THE lift of a wing depends upon the wing section, the angle of attack at which the wing is set to the wind-stream, the density of the air at that time, the projected area of the wing and the velocity of the air-stream passing over the wing. The rule is comparatively simple, but in order to work it, we must have definite test data on the type of the wing section such as is obtainable from a laboratory.

In the first place, in the simplest formula for lift, we have the symbol (K_y) or the "coefficient of lift". This takes the effect of the wing section and the angle of attack into account—assuming that the air is at its normal sea-level density. The better the wing, or the greater the angle of attack (within limits), the greater will be (K_y) and the total lift. The value of (K_y) for different wings and wing angles must be taken from test graphs.

Next, the lift depends directly upon the area of the wing, that is, upon the area of a shadow cast directly under the wing—and not the area of both sides. A wing of the same proportions, having an area of 100 square feet, has twice the lift of 50 square feet, all other conditions being constant.

Then we come to the matter of air-stream velocity with which the lift varies as the "square" of the speed. That is, if the speed is doubled, within the ordinary range of speeds now attained, the lift will be increased four times—not simply doubled. Thus, the lift increases very rapidly with any increase in the speed so that with a high-speed machine it will be necessary to reduce the area to avoid very small and inefficient angles of attack.

If we allow (K_y) to represent the angle of attack, as before, allow (A) to represent the projected wing area in square feet and (V) the speed in miles per hour, then the lift in pounds (L) with standard air density will be:

$$L = K_y \times A \times V^2$$

In practice, certain modifications must be made to compromise for the "scale factor", the aspect ratio of the wings and certain other items, including the effect of the propeller slip-stream. This is correct for only one angle of attack, and for any other angle, a new and corresponding value of (K_y) must be taken into account.

QUESTION:—*What is meant by "piston displacement", and just what relation has this factor to the performance of a gasoline engine? Then, further, what is the meaning of "cubic inches displacement per horsepower"? Is it possible to compute horsepower with this factor?*

ANSWER:—THE displacement of a single cylinder is the number of cubic inches swept out by the piston on one stroke. In other words, if the area of the piston head

(*Continued on page* 333)

Further Study of Fog

Specially arranged microscope for studying fogs and moisture precipitation.

SCIENTISTS of the Massachusetts Institute of Technology have established an experimental station at Round Hill, Mass. The illustration shows a member of the staff using the new, specially designed, microscope for the study of fog.

With this instrument, it is possible to observe and measure the size of the individual droplets of moisture that make up the fog. What are believed to be the first actual photographs of the fog particles, have been taken.

With this and other apparatus the sicentists hope to make a big stride forward in conquering fog for aerial safety.

Modern Currycomb for Planes

JIMMY WEDELL, one of the ace flyers of the southlands, learned the trick of making his plane fly faster. He is shown waxing his low-wing monoplane for a try at the coast-to-coast record. He believes he will reduce the skin-friction.

Wedell putting the finishing touches to his slippery tail surfaces.

What Our Readers Are Building

A department devoted to our reader's activities in airplane and glider construction.

AS Mr. Rathbun said in the *Airy Chat* last month, it is getting to the time where the fellows are getting out the old crates for another season of hedge-hopping and cloud-hopping. We expect to be swamped from now on with fine stories and photos of the planes *Our Readers* have been building this past winter.

We are all ready for them. Two pages of the latest dope. How do you like it? Since this is *your* magazine, and *your* page, we want to do just what *you* want.

Many of our readers have written in for the proper dope on fixing up the "A" and "T" engines for aerial use. We are trying to get the latest information on that subject, and will publish it as soon as it comes in.

We received some fine stories this month. Without further comment, here they are.

The Cloud Ranger's Club

The Cloud-Ranger's glider in flight.

THE Cloud Ranger's Club, of Medicine Hat, Alberta, Canada, designed and built their own glider.

They float around the skies in their "Gull". This glider was designed and built by the club. It has a span of 37 feet, and a length of 18 feet. The wing loading is 1.8 pounds per square foot and the gliding angle is approximately 12 to 1.

Car towing has been used exclusively and has proven to be most satisfactory. Only one incident of note has occurred when the glider began to "mush" at about fifty feet. There was a little excitement when the glider showed no tendency to fall off, but at the last moment she came out of it and a safe landing was made.

The Cloud-Ranger's glider at rest.

A Neat Little Ford Powered Job by Duncan

This view of H. A. Duncan's Ford powered lightplane reflects great credit upon its builder.

WE wonder if Henry Ford realized what he was doing when he designed his little engine? It is even money that he did not expect them to leave Mother Earth as much as the "T's" and "A's" seem to do.

H. A. Duncan, of Beaumont, Texas, has hung a Ford Model "A" in his "Skyrover". On the ground it delivers 1,850 r.p.m., but as he has no tachometer, the r.p.m. in the air is unknown. Duncan uses a "Clark Y" wing section. Under good air conditions he is able to take off in 175 feet.

The photograph shows an axle-type landing gear, but this has been changed to the split type. The plane has a top speed of about 85 m.p.h.

Building and Flying a Fool-Proof Glider

IT ALL started in the good old days of 1929 when like umpteen dozen others I spent three months in building a glider and three days in cracking it.

Due to a lucky twinkle of the star, fourth from the end on Orion's Belt, or something like that, I walked away from the wreckage on my own power, then like that same umpteen dozen who managed to survive their first glider, I built another.

This time it was a club affair at Iowa State College. Being full of ignorance and energy at the time, I told the boys that it would be easy to build a "fool-proof" one and they, being as ignorant as I, all voted for it. The decision was made just like that, but when we sat down with drawing board and slide rule to design the perfect glider it looked like the proverbial grey horse of a different hue.

Many weighty arguments ensued and many plans were drawn and discarded but finally there emerged on paper one which was to have a fuselage of steel tubing, a landing skid with a large shock absorber, a large wing, and floating ailerons.

We thought the design was hard but after eight months of rib glueing and tube welding we were unanimous in giving first honors to the construction. It was "foolproof" though and that idea kept us going until its completion in July of 1930.

The trial flight was set for four a.m. in order to obtain the maximum of stillness in the air and the minimum of

The so-called "fool-proof glider", which did not prove to be so fool-proof after all.

spectators on the sidelines. I strapped myself into the "seat of execution," gave the boy in the car the signal. We started down the field.

Not having a Murad, I was somewhat nervous, dontcha know, but just as the sliderule had predicted it rose to the unmistakable altitude of five feet and at the end of the run descended heavily on the well cushioned skid. I tried it again, this time going up to about twenty feet. The balance was right, the controls were right. We had not slipped a decimal point in our computations nor divided by four instead of two.

"Remarkable," says I to myself, and the old chest expanded about three inches. I tried it a third time, used the rudder a little, brought it in sideways, and broke the skid. The foolproof glider had been broken on the third flight. Down went the chest.

THE remainder of the day was spent in repairing said skid. I had learned my lesson though, and from then on the rudder was tied. The next morning I rehearsed with one of the members what he ought to do when he found himself leaving terra firma, strapped him into the seat, and lifted him into the air. He landed successfully and all were happy. We tried it again.

Again, he landed top side up. But the third time the driver got his orders mixed, stalled the glider, and two tubes were buckled in the nose. That was six flights and two repair jobs for the "foolproof" glider. The chest sunk in three inches.

Aside from that we had no special difficulties. We used auto towing exclusively and contrary to the advice of those who had only flown "ordinary" gliders, we would skid our new student across the field not more than three times before putting him into the air. We experienced no difficulty with this method, and by the time I had left, sixteen had lifted themselves.

Not having the rudder to think about, it was interesting to see how quickly each new man learned to master the stick. After from one to five trials, he was making almost perfect landings, and when we put him up to four hundred feet, he did his turns without appreciable slip or skid.

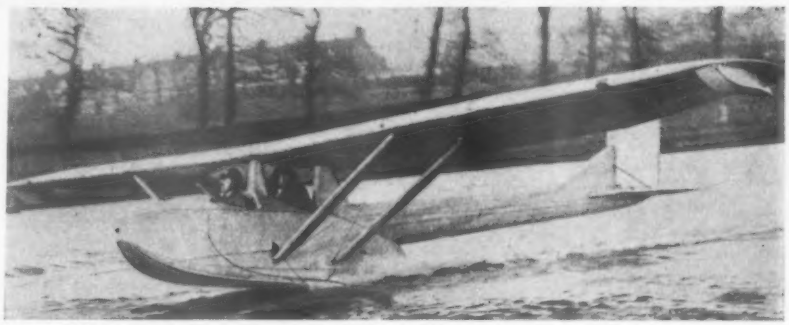
Freedom from the slipping and skidding was largely due to the characteristics of the floating ailerons. Two of us had done 360 degree turns and approximately 250 flights had been made when I left town. No one had received so much as a scratch.

First: There is no such thing as a "foolproof" glider.

Second: A certain amount of technique is necessary for the successful instruction on the best of gliders.

Third: Floating ailerons with a tied rudder, and a shock absorber on the main skid aid remarkably in simplifying the instruction technique and in improving the safety of this type of flying.

A Novel English Aqua-Glider



A well designed English aqua-glider.

MOST of the aqua-gliders constructed to date have been of a rather primitive type, hardly more than a primary trainer mounted on makeshift pontoons. For experimental purposes, this is really all that is necessary, it is true, but for efficient operation and comfort it is hardly enough.

Now comes into our view a highly developed aqua-glider built in England, shown above. The photograph was sent to us by one of our English readers, Mr. Alfred Southcombe of Leeds, England, but he failed to disclose the names of the builders. We trust that they are readers of POPULAR AVIATION so that they are eligible to this department.

As you will see, this is a miniature edition of a flying boat that indicates careful thought in the construction and design. It has the typical hull and trussed tail group of a powered ship.

Plane Races Motorcycle But Loses

A hotly contested race between a lightplane and motorcycle.

EDWARD JACKSON built himself this little lightplane on which he learned to fly in less than ten hours. Since its construction, the little ship has paid handsome dividends for its owner from the various races in which he has been entered.

However, when he picked out the motorcycle to race, as shown in the above picture, the motorcycle won the race by a narrow margin. This was probably due to the fact that the track was a small one, which gave a decided advantage to the motorcycle.

This is just a suggestion for owners of lightplanes as a chance to earn a little money with the ship.

A Glider From Montreal

A hang-type glider from Montreal.

A NOVEL hang-type monoplane glider comes to us from Montreal, Quebec, the product of a glider club in that city. Wilson Hammond, a member of that club has written a very fine letter descriptive of the ship and the club. He says that the little ship showed excellent gliding qualities, although most of the flights were hand towed.

Model V.—Heath Parasol

J. B. BURNETT, Box 492, Weirton, West Virginia, is a doubly welcome contributor. In addition to the "Reader's Page," he sent in a well filled petition. Thank you, J. B.

He has built this good looking Heath Parasol, Model V. It is a welded job, built up from raw materials. The plane takes off in 200 feet with a fine climbing and flying ability. After the test-hop, only a little modification of one wing was necessary. Fine work. Best wishes.

This Heath Parasol is equipped with a Ford engine.

Practical Lessons in Flying

by JOHN B. RATHBUN

Ed demonstrates two common causes of flying accidents for Bob's information.

THERE had been two accidents at a neighboring airport within the past week, bad crackups so far as the ships were concerned, but fortunately no one had been seriously injured. Of course, this led to a lot of cackle on the part of the students of that school and all the Fairfield Airport that Bob attended there were guesses and conjectures without end. So Bob determined to get some official information on the subject.

On arriving at the airport that morning, Bob the flight student, walked briskly into the hangar and buttonholed Ed Keith, the pilot-instructor. "Say, Ed, give me the low-down on those two wing-busters over at Smith's place. They tell me all sorts of things happened, but I want to hear the true dope from you. What was the matter, Ed?"

"As I've been telling you, Smitty gets kind of lax and careless with his instructors and instructions every once in a while—that's the fundamental trouble. When it costs him a ship every once in a while, I should think he would get over the habit—but he doesn't."

"Well, well, after the sermon is over, let's get around to the cause of the spill," mocked Bob. "I'll say one thing, though; Ed, you tell 'em enough so they don't get hurt over here—and believe me, that's something to your credit. Proceed, big boy, I'm all ears."

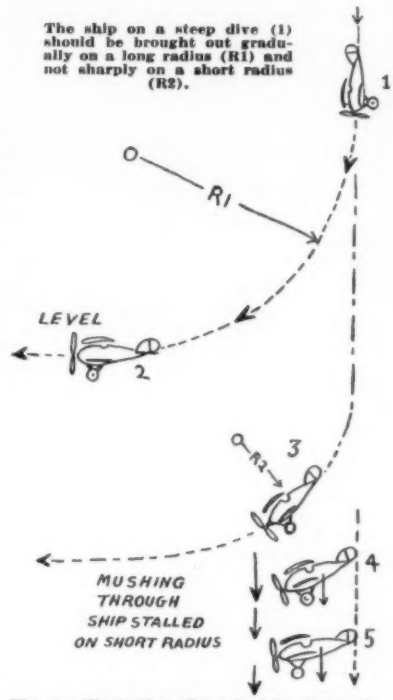
"Spill No. 1 was caused by the ship 'mushing-through' after a steep dive. Mighty good thing that lad started to level off at 500 feet instead of getting down where they generally flatten out. And Friday's big muss was the usual climbing-turn on too short a radius and too close to the ground," explained Ed.

"Did I ever mush-through"? asked Bob."

"Yes. But you didn't know it at the time because I covered it up for you. Now, to get this thing settled in your mind while your mind is open to accept the dope, I will put you next to this mushing business so that you will avoid it in the future."

ED THOUGHT things over for a few moments and then started. "When you get right down to the facts in the matter, a 'mush' is nothing more than a stalled position, generally brought on by sudden turns or pull-outs. The turn or pull-out is too sharp for the ship to follow and she then continues approximately along the original path without any further attention to the controls."

"Don't this expression also apply to something that happens at the end of a long dive when the controls aren't handled properly"? asked Bob.



The ship on a steep dive (1) should be brought out gradually on a long radius (R1) and not sharply on a short radius (R2).

Fig. 1. Illustrating the principle of "mushing through" oftentimes a dangerous proceeding when close to the ground. This is really a stalled condition.

"You bet. Take the case at the end of a long swift dive," said Ed. "The would-be pilot now tries to straighten her out, but he pulls back on the stick too suddenly. The downward velocity and the momentum of the ship are now greater than the air pressure on the lifting surfaces, therefore the ship will continue to move down along the horizontal line as before, although the ship itself may be partly or entirely leveled off.

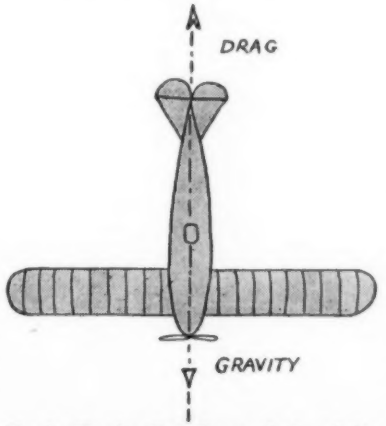


Fig. 2. Showing that the speed of a diving plane increases until the drag equals the weight.

"Let me draw a diagram for you." Ed then drew a sketch similar to Fig. 1. "The ship is diving vertically at (1), but the pilot very gradually pulls it out into the horizontal around the long easy radius (R1). By doing this very gradually, the ship has time in which to turn over without creating excessive loads on the wing surfaces. At (2) he is nicely leveled off.

"Now, the way that the fresh Smith guy pulled the job will be seen at the bottom of my diagram. He starts to level off at (3) by suddenly pulling the stick full back. The ship turns nearly into the horizontal so far as its fuselage is concerned, but as it has had time to make the turn, it continues to travel along the vertical line to the positions (4) and (5). As it is not traveling forward, but only downward, you can easily see that this is nothing more or less than a good old-fashioned stall.

"Now we've talked a lot about this thing, and we'll prove what I have just explained. I'll repeat everything that fellow Smith did—except crash the ship. All right, shake a leg and get over to the ship. We're overdue now and there'll be a big party here after this ship in less than half an hour."

They trotted over to where old No. 7 was warming up, and soon they were taking off at the north end of the field—Ed's pet runway. After steadily climbing to about 2,500 feet, Ed's voice came over the phones.

"Gimme the stick, and I'll show you just what happens when you pull out normally from a dive and then we'll climb back and repeat that Smith pup's stunt—minus the wrecked fuselage. Now, as soon as I give you the high-ball, watch the air-speed meter and take in any other effects that you might notice during the meantime."

"OFF," said Ed, as he pointed her nose down on a 90 degree dive. Almost instantly the air-speed meter started moving up the scale—100, 110, 120, 130, 140, 150, 160, 170, 180 m. p. h. Then the dive continued, apparently without change, but there was no further advance of the instrument's pointer. At 800 feet, Bob felt himself pushed down on the seat with unusual force and then they came out into the horizontal. Down dropped the air-speed meter to the customary 90 m.p.h. that they attained in horizontal flight.

"Hey Bob, what did you see and dis-

cover?" came Ed's voice over the phones. "How did the air-speed meter behave, and how did you feel when I pulled out? Notice anything peculiar?"

"Yeah," said Bob. "One thing that I noticed was a queer tired dopey feeling that came on just as you pulled out. Does that mean anything in your life?"

"Yes. I just wanted to call your attention to that effect even on long easy take-outs like this last one. That was the effect of the centripetal force on the blood in your brain. This force reduces the blood pressure by pulling the greater part of the blood away from the brain—hence the dopey feeling. If I had pulled out as quickly as that Smith fellow did, you wouldn't have felt or known anything. With a quick turn-out, after a long dive, the force is often so great that the pilot may become partly unconscious for a few seconds, and when this happens, there are all sorts of opportunities for accidents.

"Well, did you notice anything else," asked Ed. "What about the air-speed meter and its capers during this time?"

"Oh yes, what is the matter with the air-speed meter?" asked Bob. "It ran straight up to 180 m.p.h., right at the beginning of the dive, but then it remained constantly at 180 m.p.h. during the rest of the dive. Is this as far as it reads or is the meter stuck?"

"There's nothing the matter with the meter," answered Ed. "It told the truth all the time, but it did look rather queer—didn't it? When an airplane falls, it increases its speed steadily until it is going so fast that its resistance is equal to its weight. From that point on, it continues to fall at a uniform speed, which in this particular ship is 180 m.p.h."

"Gravity keeps pulling the ship down

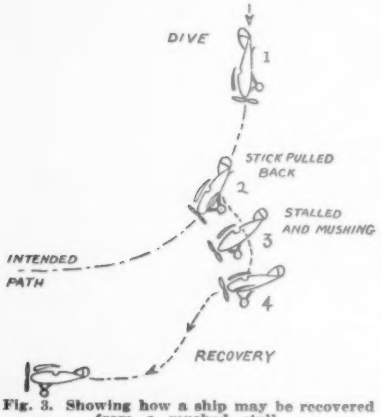


Fig. 3. Showing how a ship may be recovered from a mushed stall.

with a force equal to the weight of the ship, and finally this is balanced by the equal and opposite resistance as indicated in Fig. 2."

BOB thought a moment, and then came back at Ed with the old query: "Yes, I can see how a plane will fall until the air resistance is equal to its weight, but what about a power dive with the engine and prop pulling her down in addition to the force of gravity?" Bob sat back and smiled, for he thought that he had propounded a sticker for friend Ed.

EDITOR'S NOTE: And here we come to the end of the "Practical Flying Lessons" which have been a feature of POPULAR AVIATION *for the past two years. We sincerely trust that our two heroes, Bob and Ed, have made many friends among our readers.*

However, we would be very glad if our readers would write to us and give their opinion of this series, and whether they would care to renew their acquaintance with Bob and Ed in another series in some other branch of Aviation, in meteorology, a mechanic's course or doing other stunts.

"The engine and prop will increase the speed at the beginning of the dive, but what effect they have later depends upon the pitch-speed of the propeller. If the natural gravity diving speed of the ship exceeds the pitch speed of the propeller, then the prop will have no influence at all after the dive is well under way. On the other hand, if the pitch speed of the propeller is greater than the gravity diving speed, then the prop will increase the diving speed, and that's that."

"Now, the effective pitch of this propeller is five feet, that is, the prop moves ahead five feet for each revolution. When it is turning up to a maximum speed of 1,900 r.p.m., it would move ahead 9,500 feet per minute, or at the rate of nearly 120 miles per hour. Let's call it 120 m.p.h. for simplicity. As you have seen, the greatest gravity diving speed is 180 m.p.h., so that the speed of the propeller would be less than the gravity speed by nearly one mile per minute. This means that the prop would have no effect on the diving speed at all near the end of the dive or when the ship attained the maximum diving speed."

"Baloney," cried Bob, rather distressed to see his exam fall flat. "You're adding power to gravity, therefore the speed is bound to increase. Even though the pitch speed of the prop is less than the ship speed, yet it must be doing some work, somewhere."

"All right. Here's a chance to try out our theories," said Ed. "You're convinced that the free gravity diving speed is 180 m.p.h., aren't you? Well, we'll mark her upstairs to 4,000 feet and then dive her with the engine full on, and see what happens. Gimme the stick, Bob, for I want to take her out of this dive myself, but when I give you the word, give her the gun good and proper."

Ed took hold and soon had her climbing to the 4,000 foot level. After their arrival, Ed signalled Bob to open her up, and then pointed the nose down. Bob quickly noted by the singing of the stays that she entered into the dive much faster than before, but a glance at the air-speed meter showed that there was a decided change in the exhaust of the engine about 120 m.p.h.—the point where the load on the engine fell to zero.

They were certainly pulling the earth up to them, but the air-speed needle rose up to 180 m.p.h. and stayed there, throttle or no throttle. There was nothing Bob could do with the engine that would increase the speed beyond this point. Ed was right, after all.

"All right, cut her," came singing through the phones. "Now I'll give you an example of 'mushing through', just like your friend Smith did. Watch your air-speed meter, if you're still able to notice anything—and tell me about it later. Back she goes."

Ed pulled the stick back much quicker than was normal in a dive like this, and then the whole world suddenly blurred before Bob's eyes. He gamely tried to see the meter indication but lost out. More blood pressure and centripetal force business on a big scale had put Bob out for the moment.

Ed leveled her out at 1,000 feet, but he was quite near the ground when he had finished. As a matter of fact, the mushing and the second corrective dive for recovery had brought dim down within 300 feet of the ground. Too close to be comfortable. He had stalled the ship, pointed her down and recovered flying speed in the difference between 1,000 feet and 300 feet.

"Well, Bob, what did the meter say this time—if anything?"

BOB's reply was only a burbling sound, but finally he confessed, "I couldn't see the air-speed meter very well. You yanked her out too hard."

This drew a snort of amusement

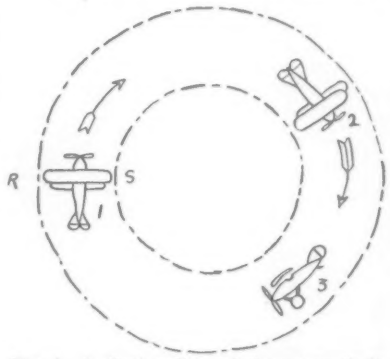


Fig. 4. A short radius spiral may result in a stall or a spin because the inner wing travels slowly.

from Ed, but he refrained from joking about it. Instead, he straightened out his face and proceeded calmly to explain what had happened. (See Fig. 3.)

"Well, I pulled back on her quick and she tried to flatten out—but didn't have the time to do it. (Position 2.) She was stalled, so far as forward motion was concerned and the air-speed meter reading was, of course, zero. She

(*Continued on page* 326)

Elementary Lesson in Aviation Engines

by PIERRE de LOESCHNIGG *and* HERBERT L. MAGILL

A simple and concise explanation of the basic principles upon which the aviation engine depends

PROBABLY one of the most interesting features of an airplane is its engine, although this important element has been slighted or has been given but slight attention in the majority of publications.

It is for this reason that we consider it advisable to take the subject up from the very beginning in this article, starting with the fundamental principles and then following through by easy stages to the highly developed and complex machines now in service.

To begin with, the engine provides the power or energy necessary for propelling the ship, for climbing and for its take-off. It does not create the power but simply is a means of converting heat energy of a fuel into the mechanical energy required for driving the ship against the impedance of the air. The fuel, in effect, simply stores the energy in the form of heat-producing material until it is liberated by the engine.

Now, the method of liberating the energy of the fuel divides engines into two principal classes. If it is burned under a steam boiler or outside of the working engine, it is known as an "external combustion engine". The steam engine is the best known of this type.

Most common, by far, of all airplane engines is the internal combustion type in which the fuel is burned directly within the working cylinder of the engine. A small amount of the fuel, mixed with the proper amount of air to burn it, is drawn into the cylinder and is burned. The heat, therefore, is produced directly within the cylinder, hence "internal combustion" engine.

And now we come to the fuel—gasoline in the majority of cases or light fuel oil in the case of the Diesel engines. Both fuels are known chemically as "hydrocarbons" and are obtained from crude petroleum oil. Aviation gasoline is the most compact fuel known in respect to the amount of energy contained per pound, while fuel oil contains the most energy per gallon.

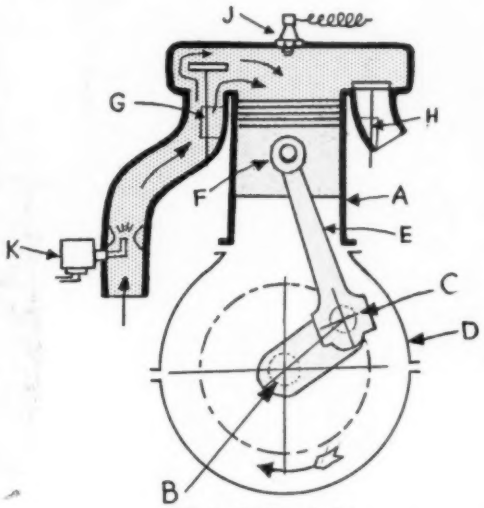


Fig. 1. Suction stroke.

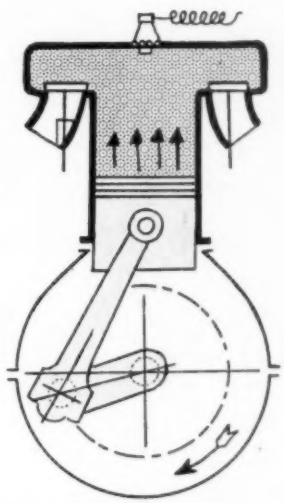


Fig. 2. Compression stroke.

The first two strokes in the gasoline engine working cycle.

To successfully burn in a gasoline engine, the liquid gasoline must first be vaporized by heat, and then mixed with the proper amount of air to burn it. This is accomplished by means of a device known as a "carbureter", which is attached to the suction or intake side of the engine.

The incoming air contacts with a spray of gasoline from the nozzle of the carbureter, and thus starts the mixture which is later completed by heating in the engine or the hot connecting pipes (manifolds).

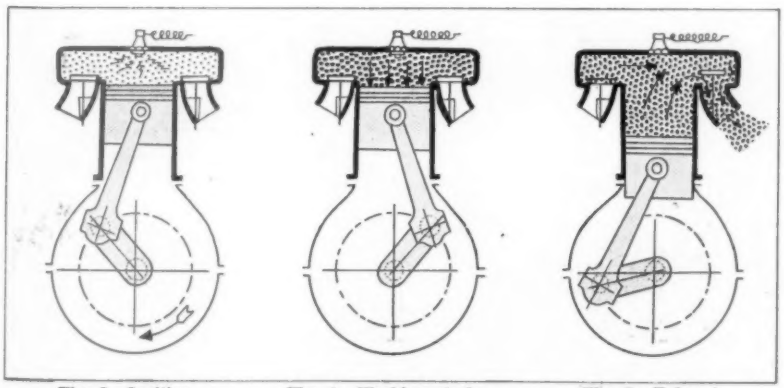


Fig. 3. Ignition. Fig. 4. Working stroke. Fig. 5. Exhaust

The last three events of the gasoline engine cycle.

TO develop the greatest amount of power from this gasoline and air mixture, it must first be compressed to a relatively high pressure. The heat produced by the compression completes vaporization, and as the volume is greatly reduced, there is less heat loss by radiation. This compression is highly important, particularly on an aviation engine, for it not only increases the amount of power developed by a given size cylinder but it also improves the efficiency.

Internal combustion engines work on two different operating schemes called cycles, the Otto, or four stroke cycle, and the two stroke cycle. By the word cycle is meant the series of successive operations, or half revolutions of the fly wheel in an engine cylinder with a single charge of explosive mixture. Motors employed at present to propel airplanes, dirigibles, in fact all power-driven aircraft as well as automobiles and the majority of motorboats, operate almost universally on the Otto or four stroke cycle.

The four stroke engine, as it is generally called, comprises the following four operations successively in the order given:

1. Admission of the combustible or explosive charge to the cylinder.
2. Compression of this charge.
3. Combustion or burning of the charge. (This includes its ignition and expansion.)
4. Exhaustion of the products of combustion.

Each of the foregoing operations oc-

(*Continued on page 321*)

New Ideas for Our Model Builders

New Model building stunts of interest, gathered from far and near for our readers.

Some Wartime Insignia

DURING that period, known as the World War, the planes of the various nations carried, in addition to the circular cocades and crosses, odd color schemes.

They were unique or plain markings, figures, animals, birds, and so forth, to indicate to what pilot, squadron or jagstaffel each machine belonged.

Perhaps the best known insignia was that of the 94th Pursuit Squadron on this country's air service entry to the battle fronts of Europe. The well known stove pipe hat of Uncle Sam was suggested by Major John Huffer, commanding officer of the 94th during that period—an old time flyer—as being the most desirable marking for their mounts.

Lieut. Walters carried the idea further by stating that the hat should be enclosed within a ring to indicate a challenge to the enemy by the air forces of the United States. The designs and sketches were made on the following day by Lieut. John Wentworth, and later were painted on the planes of that outfit.

Another "trade-mark" that is favorably known, is that of the Escadrille de Chasse Nieuport 124, more generally called the "Lafayette Escadrille". During the winter of 1916 and 1917, when this group was in Cachy, Somme sector, some of the pilots thought that a buffalo would be an appropriate distinguishing mark for their planes.

The animal that roamed the western plains didn't seem as representative to Capt. Georges Thenault, commanding officer, as the head of a fierce appearing Indian—which was adopted. Suchet, who was then a mechanic but had been a jeweler draftsman, made a drawing from an American coin shown by Diddier Masson, one of the members of that outfit.

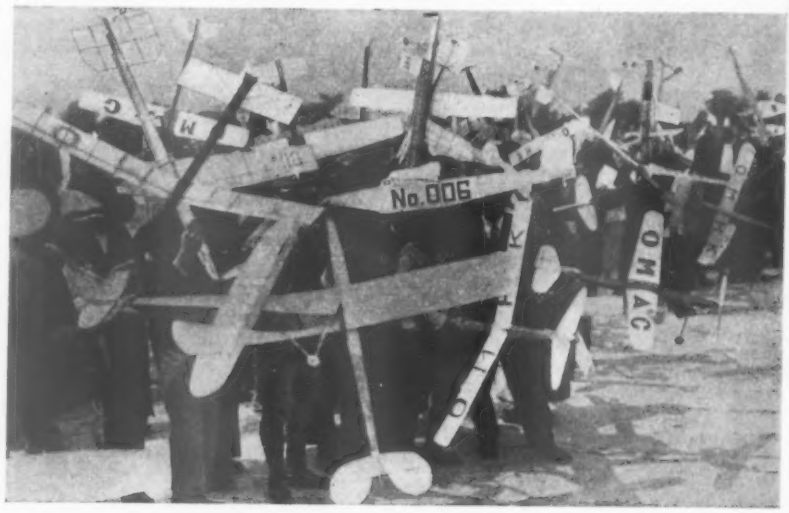
The final sketch was made by Harold Willis, who is now an architect in the eastern part of the country. Incidentally, the Lafayette Escadrille was also known as N-103 and the United States assumed control of this renowned organization on January 10, 1918. The plumed head of the "Vanishing American" is used on the planes of the present 94th Pursuit Squadron stationed at Selfridge Field, Mount Clemens, Mich., of which Lieut. Harry A. Johnson is the commanding officer.

During the World War, Charles Nungesser, who unsuccessfully tried a trans-Atlantic flight in 1927 with Coli, kidded Mata Hari (notorious woman spy of Germany) that Bert Hall was the disowned son of an American millionaire banker.

As a result, numerous "$" marks

(*Continued on page* 326)

A Sea of Airplane Models



Enthusiastic Japanese model builders stage a great show.

THE Japanese are enthusiasts of model building. The contestants shown here were gathered at the Hanoda airport, Tokyo, Japan. The winner of the first prize flew over a half mile in the air. Over 400 model airplanes were entered.

This airport is becoming internationally known as the field from which the Pacific fliers will hop off.

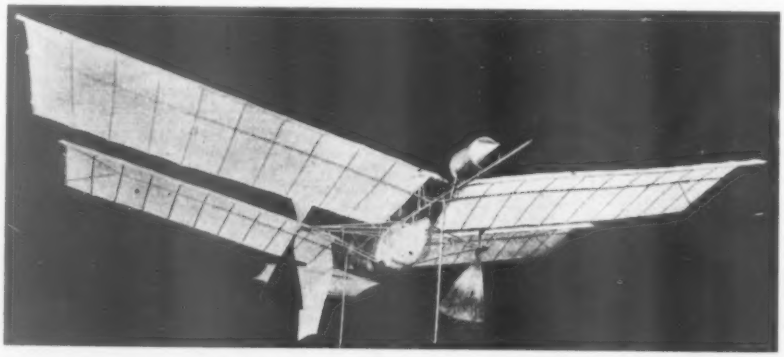
Langley's Historical Steam Driven "Aerodrome"

ACCORDING to a promise made to several of our readers, we are reproducing a photograph of the early Langley steam powered "Aerodrome". This very carefully built steam model flew about one-quarter mile over the Potomac River before the Wright Brothers made their first flight.

As will be seen, this model is a tandem monoplane, a type, by the way, that has not been much experimented with by model builders for some reason or other. It is inherently self-stable and it is probable that a type of this sort will eventually be adopted for large cabin transports.

It is driven by twin propellers located between the two pairs of wings, these propellers being supported by outriggers. It will also be noted that the wings are of the single surface type, deeply cambered with a deep dihedral angle.

After the successful tests of the model, Langley built his large machine along the same lines, which however, was wrecked through the failure of the launching gear.



Langley's steam driven "Aerodrome" now on display at the Smithsonian Institution, Washington, D. C. The engine and boiler are carried between the wings. The small tank in the foreground is the water tank.

Nieuports Are Popular

Model Nieuport from P. A. drawings.

DANIELD LAMBERT, 2312 North Saginaw St., Flint, Mich., is another reader who likes Joe Ott's plans. The Nieuport Scout that he has made was taken from the issue of last July. It has a 30 in. wing span. Danield took about a week and a half to make the model. A neat looking job, What?

Model of "Question Mark"

Eugene Johnston's "Question Mark".

SHIPS that have made history are always favorite subjects among the model airplane builders. This one, for instance, is copied from the endurance record breaker—the "Question Mark". It was constructed by Eugene R. Johnston, 1420 Otter Street, Franklin, Pa. Pretty keen, eh?

Curtiss Hawk Model

This Curtiss "Hawk" model is built with unusual attention to detail.

MURL DEDENBACH, 230 Euclid Ave., Mt. Clemens, Mich., has made this model of a Curtiss Hawk.

The model is very complete, including movable controls, illuminated dash board, instruments of ground glass, a pilot's seat and safety belt, and brake bands on the wheels.

A Letter from a Reader Who Likes Scale Plans

MICHAEL KOLCHUK, 610 Ave. D, Rochester, N. Y., sent in a photo of his Nieuport Scout. We are sorry it could not be included in this issue. His letter interests us very much. He tells what he thinks of scale drawings against dimensioned drawings. Here is his letter:

I personally think that scale plans are superior to any other type of plan. Practically any size model may be constructed from such a plan, and therefore, I place my preference upon this type of plan.

Plans with given dimensions usually do not go into thirty-seconds or sixty-fourths, but on the contrary, they stay among the sixteenths in order that it may be easier for the model builder to work from the plan. This does not insure exactness.

The scale plan, on the other hand, will be more accurate since a pair of dividers are used in determining lengths and widths from the plan. Because of this, the scale plan will not need to omit a thirty-second of a sixty-fourth.

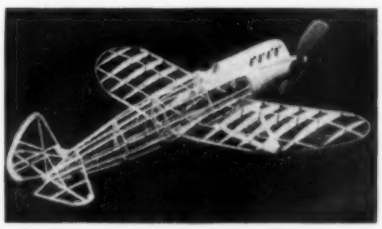
Though a scale plan takes time and work to develop, it incorporates important features that do not exist in other plans, and therefore it appears to be the more desirable plan to me.

That is the opinion of an expert in model building. So many readers have commented upon our planes that we are not sure just what to do. On the whole it seems, though, that most of them are satisfied.

A Model Airplane During Construction

HERE is something of special interest to all model builders. Raymond C. Nelson, 312 South 1st Ave., Logan, Iowa, sends in this picture of one of his recent models during the process of construction.

The entire picture is interesting, but the method of increasing the strength of the joints in the rudder and elevators is particularly good. Our model editor saw the photograph the other day, and made some very fine compliments. He considers it one of the best frameworks for a model plane that has come to his notice for a long time.



Assembled skeleton of model.

Howard Jongeward Shows Skill

The Lockheed "Vega" in full flight.

HERE are two of the finest models that have come into the offices of POPULAR AVIATION in a long time.

Howard Jongeward, a mine electrician, of Salome, Ariz., made these models, one a Lockheed-Vega, and the other a Boeing P-12-B. The Boeing took second place in the California State Fair in 1930. Both models have a 24-inch wing spread. The controls work from the pilot's seat. They also carry full lighting equipment.

A dog-fight between two models.

As can be seen in the picture they are both flying models. The dog-fight is perfect. It is hard to believe that the planes are models and not the real thing.

The photographs are as good as the models. We would like to get more like these.

Pictures of models in flight are always interesting. They add a whole lot of pep to this section and that's what we like and what our readers like. There is one more comment that we would like to make, and that is, the camera must have been a pretty speedy one to get photos like this; sharp and clear without a blur.

MODEL DEPARTMENT

How to Build the Bernard "C. I." Monoplane

by

JOSEPH S. OTT

The finished model is strikingly beautiful—speed in every line.

THE Bernard is a full cantilever, high speed, modern French plane. A water cooled engine, "V" type, of over 500 horsepower is used to drive this airplane at a speed in excess of 208 miles an hour. When one considers the strength required to meet all the stress conditions of a full cantilever plane at high speed it will be understood that the structure must be the best and the finest. The plane is designed to withstand the tremendous strain of diving and looping at full speed.

The finished model as illustrated in this article has a total weight of two and three-quarter ounces complete. In its reduced form, is an exact scale of all the parts, including the position of the wing, the size of the rudder and stabilizer, with the only addition of one inch to the diameter of the propeller. The motor banks as seen on the full view photograph are necessary to help balance the model for flying.

Note that two shades of tissue paper are employed in covering the wings and stabilizer. The colors used are white and orange. Orange to the front and white to the rear. The colors are run crosswise from the leading edge near the body to the trailing edge at the tip of the aileron.

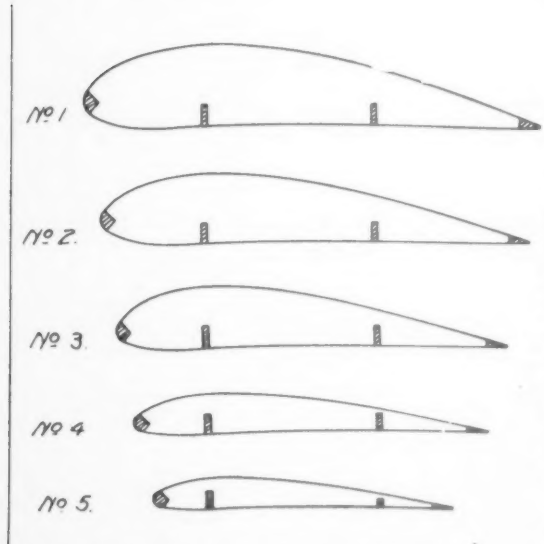
The wing blocks are cut from one piece of very light balsa and hollowed on the inside. One is left and one is right. A special sketch on the drawing will show the carving method. These parts are painted red on the finished model.

The landing gear is made of solid balsa and reinforced with a bamboo entering-edge. It continues up into the body and along one of the formers to help strengthen the balsa strut.

The landing gear is painted black, the same as the motor banks. The propeller is painted aluminum, with a red nose. The colors of tissue on the stabilizer are the same as those on the wing.

When preparing the tissue, stick two opposite colors together, overlapping approximately ⅛ of an inch. After the covering has been fitted and applied to the wing a narrow black stripe is cemented over at the point where the two colored tissues meet. This makes a sharp contrast and adds to the attractiveness of the finished model.

The head rest and the rear or tail part of the fuselage are finished in red. The motor stick is sixteen inches long and requires ten to twelve strands of rubber, 1/32x⅛ inch on a ten inch medium pitched propeller.



The nose ribs are cut as required on assembled wing.

Full size ribs for the 15-inch model.

LIST OF MATERIALS

1. Longerons, 3/32x3/32x30 in., Balsa 8
2. Bulkheads, 1/32x2½x30 in., Balsa 1
3. Fairing strips, 1/32x3/32x30 in., Balsa 10
4. Head rest, 1x2x24 in., Balsa.... 1
5. Bamboo, 1/16x¼x12 in..... 1
6. Motor stick, 3/16x¼x16 in., Balsa 1
7. Rubber, 1/32x⅛ in. x 15 ft..... 1
8. Piano wire, .031x24 in., Tinned.. 1
9. Propeller, ¾x1x10 in., Balsa.... 1
10. Rib stock, 1/16x2½x30 in., Balsa 1
11. Spars, 1/16x3/16x30 in., Balsa.. 2
12. Entering edge, ⅛x⅛x30 in., Balsa 1
13. Trailing edge, 1/16x3/16x30 in., Balsa 1
14. Wheels, 1⅞ in. diam., Celluloid.. 2
15. Tissue, 20x24 in., Orange and white 1
16. Tissue, 20x24 in., Black..... 1
17. Lacquer, small jar, Red and black 1
18. Cement, large tube, Clear..... 1
19. Dope, small jar, Clear..... 1
20. Washers, ⅛ in. diameter, Brass. 3

DETAILED BUILDING INSTRUCTIONS

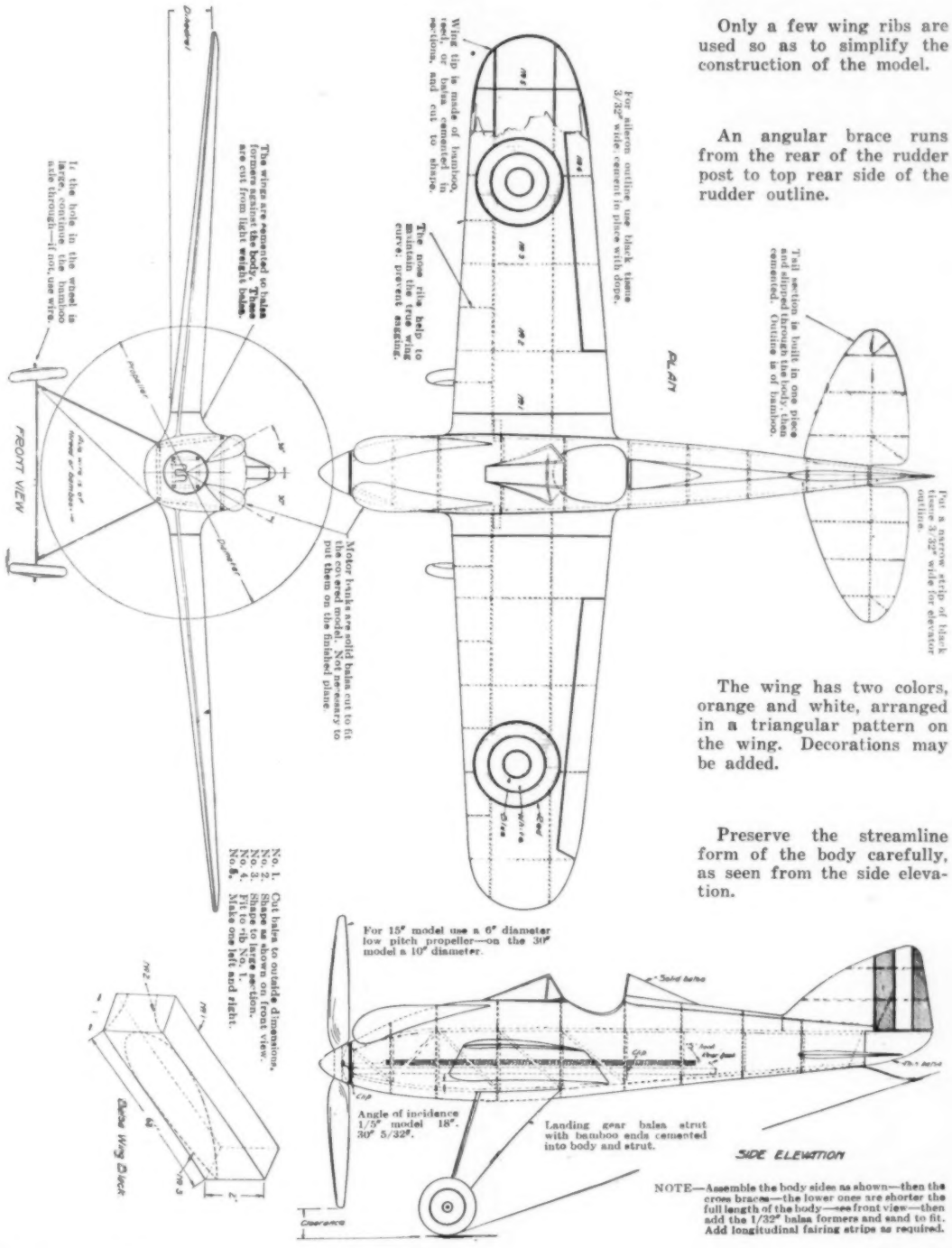
Body

AFTER deciding upon the size of model that you wish to build, scale a fuselage side to the full dimensions

The Bernard C. I. Monoplane

A Flying Scale Model

This is a 500 h. p. French racing type that has achieved considerable success.


Only a few wing ribs are used so as to simplify the construction of the model.
An angular brace runs from the rear of the rudder post to top rear side of the rudder outline.
The wing has two colors, orange and white, arranged in a triangular pattern on the wing. Decorations may be added.
Preserve the streamline form of the body carefully, as seen from the side elevation.
Wing tip is made of bamboo, reed, or balsa cemented in sections, and cut to shape.
For aileron outline use black tissue 3/32" wide, cement in place with dope.
The nine ribs help to maintain the true wing curve; prevent sagging.
Tail section is built in one piece and slipped through the body; then cemented. Outline is of bamboo.
Put a narrow strip of black tissue 3/32" wide for elevator outline.
If the hole in the wheel is large, continue the bamboo axle through—if not, use wire.
The wings are mounted on balsa formers against the body. These are cut from light weight balsa.
Motor bands are solid balsa cut to fit the covered model. Not necessary to put them on the finished plane.
FRONT VIEW
PLAN
No. 1. Cut balsa to outside dimensions.
No. 2. Shape as shown on front view.
No. 3. Shape to large section.
No. 4. Fit to rib No. 1.
No. 5. Make one left and right.
Outer Wing Rib
For 15" model use a 6" diameter low pitch propeller—on the 30" model a 10" diameter.
Solid balsa
Angle of incidence 1/5" model 18". 30" 5/32".
Landing gear balsa strut with bamboo ends cemented into body and strut.
SIDE ELEVATION
Clearance
NOTE—Assemble the body sides as shown—then the cross braces—the lower ones are shorter the full length of the body—see front view—then add the 1/32" balsa formers and sand to fit. Add longitudinal fairing strips as required.

SPECIALS

1/32x2x36" balsa,	7 for 25c	Hakone tissue — Red,	
1/16x2x36" balsa,	6 for 25c	White, Blue, Brown, Green	
1/8x2x36" balsa,	5 for 25c	and Orange 3 sheets for	10c
2x4x36" balsa,	45c	1/32 sq. rubber	75' 10c
2x6x36" balsa,	75c	3/64 sq. rubber	50' 10c
3/8x1/2x5" balsa,	7 for 5c	3/32 flat rubber	40' 10c
1/2x3/4x5" balsa,	6 for 5c	1/8 flat rubber	35' 10c

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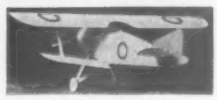

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Stinson Detroiter (a 2 ft. flying model). The following are 15-in. flying models: Fokker D-VIII and Triplane, Nieuport Scout, D. H. Tiger Moth, Sopwith Camel, Albertross D-III, S E 5 Scout, Ansaldo, Boeing P.12 B, Travelair Mystery (Texaco 13) Spad, Stinson City of Chicago. Plans for 15-in. models 10c each, 3 for 25c. Kits come complete with celluloid wheels, colored tissue, insignia, etc.

Dummy Motors, 1½ in. di., 9 cyl., 17c each; 3 in. di., 30c each. Coulings 22c each. Pants 28c pair. Celluloid Wheels, ¾ in. di., 2 pair 9c; 1 in. di., 7c pr. 1¾ in. di , 9c pr. 1⅞ in. di., 13c pr. 3¼ in. di., 28c pr.

Washers, 2 doz. 3c, large or small.

Colored dope, 2 oz. can 11c. Special colored dope 1 oz. 13c. Colors: Red, blue, white, cream, black, gold, aluminum, green, brown, orange, pink, grey, olive drab, purple and yellow.

Celluloid Cement, 2 oz. can, 11c; 1 pt., 75c.

Jap tissue, 3 sheets 7c (red, white, blue, orange, green, brown).

Dope, Acetone, Banana Oil (same price), 2 oz. 7c.

Music Spring Wire No. 4, 5, 6, 8, 10, 12, 14, 16, 18, 10 ft. rolls only, 3c each.

Para Rubber: A new fresh stock 1/32 sq., 50 ft. 7c 3/64 flat, 50 ft. 11c; 1/16 flat, 50 ft. 15c; 1/8 flat, 50 ft. 16c; 3/16 flat 50 ft. 20c.

Bamboo, 1/16 sq., 4 pieces 1c; Winders, 30c each (double geared). Reed, 1/32, 3/64, 1/16 in. di., 5 ft. 3c; 1/8 in. di., 8 ft. 5c. Thrust bearings, large or small, 16c dozen. Scrap Kits, $1.00 value, 25c.

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1/16 x 2	5 for 9c	1/8 x 1/8	16 for 5c
3/32 x 2	4 for 9c	1/8 x 1/4	16 for 12c
1/8 x 2	4 for 13c	1/4 x 1/2	1 for 2c
3/16 x 2	2 for 11c	1/2 x 1/2	1 for 4c
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and work directly over the pattern. Make two of these sides. After the first one is complete lay a piece of wax paper over it, and build the second side directly on top. When cutting the uprights for the first body side, make two pieces at the same time, which will assure of having both sides alike.

After the two sides are dry, draw a full size layout of the top view. This part of the body should be assembled at the same time that the bottom side is put together. Keep in mind that the lower cross pieces are a trifle shorter the entire length of the fuselage, as illustrated in the front view of the drawing. The first section is square, because the nose is perfectly round, but the rest are tapered.

After the body has been assembled in the oblong form, add the bulk heads on the sides, top and bottom. Sand off so that the contour of the model when looking down the full length will have an even and gradual curve.

The fairing strips are added by notching into the thin bulk-heads. It is best to put one bulk-head in the middle and add one or two on each side. In most cases three bulk-heads on each side and two underneath will be enough. On top in front of the cockpit five may be added. To the rear, one on each side of the head rest will be sufficient.

Rudder

THE outline of the rudder is thin bent bamboo. The rudder post or the upright that divides the rudder section from the fin should be one long piece, extending from the bottom of the fuselage. The ribs employed in the rudder construction are in pieces in front and behind the rudder post.

Landing Gear

THE landing gear struts are made of one piece of balsa, reinforced at the leading edge, with a bamboo strip. The axle is also made of bamboo and continues in one piece through each wheel, eliminating an extra piece of wire for this small piece of the axle. Where the landing gear and axle meet, use some thread and bind these two parts securely together.

Ribs

FOR the thirty inch model the ribs should be 1/16 of an inch thick. Two of each type are used of each size. After the spars and leading and trailing edges are in place, the nose rib, one between each full rib, is added.

Wing Block

TWO wing blocks should be carved as illustrated in the drawing, one left and one right. Use very light balsa for this part. When attaching the spars cut out a section so that they extend about one-half inch into the wing block. The wing block is attached to the fuselage after the model has been covered and two small blocks approximately ¼x½x1 inch are sunk into the wing blocks and then attached to the side of the body former as illustrated in the top view.

Stabilizer

THE stabilizer is built in one piece. The outline is of bamboo and should be made in two pieces attached at the center. The whole unit is pushed through the body so that half is equally divided on each side of the body. Cement securely in place in the proper position as illustrated on the side view of the drawing. The ribs are made in two pieces in front and to the rear of the spar.

Motor Stick

THE motor stick is of conventional design and is approximately sixteen inches long. Eight to twelve strands of ⅛ inch rubber is necessary to turn a ten inch propeller. One clip is cemented in place at the nose of the model and another one across the first bulk-head just to the rear of the cockpit.

Propeller

THE propeller is carved from a block ¾x1x10 inches. A small flat section at the center of the propeller is arranged so that the nose spinner may go directly over this part. The inside of the nose spinner is slightly hollowed.

END

Airy Chat

(*Continued from page* 280)

True enough, about printing lightplane plans. We've had the same idea in our bonnets for a long time, but unfortunately it is difficult to get plans that will be in agreement with the various laws and regulations. There is no use trying to build a ship unless you will be permitted to fly it.

* * *

OUR dead letter department is growing so rapidly, because of careless correspondents who forget to sign their names and give their addresses, that we will be compelled to rent additional storage space if the thing keeps up. Please help a poor working lad by making sure that your name and address are on every *letter*, every *manuscript* and every *photograph* that you send in to us.

* * *

LIEUT. RICHARDSON, our old and well liked author, appears again in this issue with a new story about wartime training schools. It is novel and interesting, and contains material that is different from the average war story.

* * *

TALKING about stories, we wish to announce that "Practical Flying Lessons" has come to an end after running serially for two years. We would be very glad to hear from more of our readers concerning this series, whether they liked it or didn't like it. It might just be possible that Bob and Ed will turn up again in some other

series dealing with airplane mechanics, a ground course or something like that —perhaps navigation and meteorology.

* * *

TAKING up the next letter in turn, we find that it is from Eddie Walsh of Springfield, Minn., who signs himself, "Just Ed the Mechanic". This is just one time when a man and his wife intend to take up lightplane construction together—and we give them our best wishes for success.

I am interested in building a lightplane, that is, my wife and I are considering this step. I am a garage mechanic by trade and run a garage in a small town called "Echo". Having worked day and night in the grease, I am now entering the field of aviation for sport and pleasure. I am sure happy about it.

So now, all you fellows who have built your ships powered with Ford or four lunger motorcycle engines, let me know how they proved out. I will surely answer all letters and thank you for all of the pointers.

This is O.K., Ed. I'm sure that all of the fans will write to you that have had experience along this line.

* * *

AND last comes another letter from Alfred C. Gardner, 740 Main St., Conneaut, O. This may be a valuable letter to lightplane builders.

I will take $60.00 for the wings and welded tail group for a Model "V" Heath Parasol. Crating for shipment will be $5.00 extra. A good job by an expert workman.

END

Engine Elements

(*Continued from page 315*)

cupies the time of one piston stroke, hence as one complete revolution of the engine crankshaft includes two piston strokes (one down and one up), it is evident that one explosion occurs in each cylinder of the engine for every two complete revolutions.

In passing, it is interesting to know that this cycle was originated and patented in France by Beau de Rochas, a Frenchman, in the year 1862. However, the first practical application of the cycle was due to Dr. N. A. Otto, a German engineer, who patented in 1876 in France, and later exhibited at the World Fair in Paris the first four stroke engine of the general type in common use today. Hence the derivation of its name of Otto cycle.

The two stroke cycle (or two stroke engine) accomplishes the same abovementioned operations in only two piston strokes, thereby obtaining an explosion in each engine cylinder for each single complete revolution of the engine crankshaft. An outstanding feature that differs the two stroke from the four stroke engine, is that in the former it is necessary to pre-compress the explosive charge in order to introduce it into the engine cylinder.

At this time it is well to mention that there are two distinct types of engines or motors now used in aircraft, both of which employ the four stroke cycle of operation. They differ mainly in the kind of fuel used, and in the manner in which it is ignited and burned in the cylinder of the engine.

THE first of these types is the commonly used and familiar gasoline engine, using gasoline as its fuel. The gasoline, in order to transform it into an explosive mixture, must first be vaporized and mixed with seventeen to eighteen times its own weight of air. It is then sucked into the engine cylinder, compressed, and ignited by means of an electric spark passed through the charge.

The second type, which now has just made recently its initial appearance as an aircraft powerplant, is called the Diesel motor or engine (after the name of its inventor, Dr. Diesel, a German engineer). It uses as fuel low distillates of petroleum lacking the high volatility and flammable characteristics of gasoline. It is similar to furnace oil used in oil burners for heating homes and buildings.

The nature of the fuel itself, because of its low degree of flammability, is particularly advantageous for airplane use, where any reduction of the fire hazard is of utmost importance to safety in flight.

END

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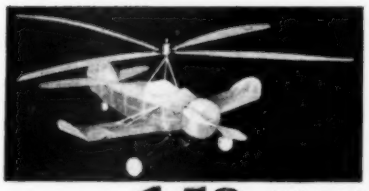

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Sufficient rubber motor for three models.
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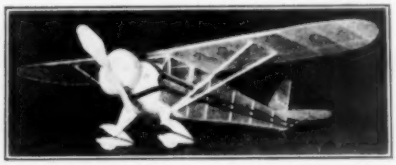

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Feeding Favorites

(*Continued from page* 285)

THE United Aircraft and Transport Corporation is the next largest beneficiary of governmental favoritism. In addition to a number of operating lines, which receive nearly 65 per cent of the total government air mail subsidy, the United Air Craft and Transport controls the Hamilton Aero Manufacturing Company, the Chance Vought Corporation, the Sikorsky Company, the Hamilton Standard Propeller Corporation, the Northrup Aircraft Corporation, the Stearman Aircraft Company and the Pratt and Whitney Aircraft Company which specializes in engines. Last year, these manufacturing subsidiaries of the United Aircraft and Transport received approximately $8,000,000 on government contracts for planes, engines and accessories.

Through interlocking directorates, the United Aircraft and Transport Corporation and the North American Aviation, Incorporated, are closely connected with the Aviation Corporation of Delaware and the Transcontinental and Western Air, Incorporated, which also receive lucrative subsidies for carrying air mail.

The Mellon interests are represented on the Aviation Corporation's board of directors and R. K. Mellon, son of R. B. Mellon, and David K. Bruce, son-in-law of Andrew W. Mellon, are both directors of the Pan-American Airways, which receives, under virtually non-competitive bids, 96 *per cent of the* $7,000,000 *which Congress appropriated in the shape of subsidiaries to encourage foreign air mail.*

It can hardly be said that the five big concerns which get nearly 90 per cent of the domestic air mail subsidy, 98 per cent of the foreign air mail subsidy and approximately 85 per cent of all the money which the government spends on airplanes, engines and accessories, maintain a lobby in Washington.

It would be beneath the dignity of the men who head these enterprises to have their agents patrol the halls of the Senate and House office buildings or to solicit administrative heads, for favors. *Nor is it necessary.*

Practically all of these five favored concerns are owned and officered by men very, very close to certain cabinet officers and high executives of the present administration in Washington. The list of their directors would be found to coincide very closely with the leading contributors to the campaign funds of previous years—nor is it to be presumed that they will be remiss in donating in the coming election.

Andrew W. Mellon, whose brother is one of the largest owners of the Pan American Airways and also is heavily interested in the Aviation Corporation, was until his recent retirement under fire, the really dominant figure in the Harding, Coolidge, and Hoover administrations.

THE City National Bank crowd of New York always have whispered with an authoritative voice to any administration in Washington. The Pennsylvania Railroad interests, which with the Chase National Bank are the substantial holders of the Transcontinental Western Air Express stock, are the most important single political factor in half a dozen Eastern states.

W. A. Harriman and Robert Lehman, who next to Mellon are the biggest stockholders of the Aviation Corporation, are influential figures in New York financial and political circles.

W. W. Crocker of San Francisco, head of a powerful California banking concern, and close personal friend of President Hoover, also has an interest in the Aviation Corporation. So has R. S. Dollar, the well known Pacific Coast shipping magnate. Men close to Henry M. Robinson, president of the First-Security National Bank of Los Angeles, are connected with the Douglas Airplane Company, a subsidiary of the North American Aviation, which seems to have a monopoly on certain types of military planes.

Incidentally, Robinson is one of President Hoover's closest friends and contributed substantially to his pre-presidential campaign.

While this inner ring, which seems to control the government's military, mail and civil aviation contracts, does not find it necessary to hire men who lobby in the usual sense of the term, it is significant, however, that not a few of its counsellors or legislative directors in Washington are men with intimate and influential political contacts.

Several of them, as former government officials, were instrumental in creating the system of government air mail subsidies which is now in a great measure supporting the corporations with which they are connected. A number of former Army and Navy officers, who know departmental red tape and are on friendly terms wtih procurement officials, also are employed in minor capacities by these same firms.

Former Postmaster General Harry S. New, under whom the government first started carrying air mail, is a director of the Aviation Corporation. Paul Henderson, former assistant postmaster general in charge of the air mail, is counsel for the United Air Craft and Transport Corporation. Henderson also is a son-in-law of the late Martin Madden of Illinois, former chairman of the powerful House Appropriations Committee.

COUNSEL for the Transcontinental Western Air Express is William P. MacCracken, Jr., former assistant secretary of commerce in charge of the division of aeronautics under Herbert Hoover. Herbert Hoover, Jr., formerly was technical radio adviser for the Transcontinental Western Air Express. He is now on leave of absence. Mabel Willebrandt, who campaigned for Hoover and was assistant United States attorney general, was the Washington attorney for the Aviation Corporation.

Thomas T. C. Gregory, San Francisco attorney, former assistant director under Hoover in the American Relief Association, fellow trustee of Stanford

(*Continued on page* 324)

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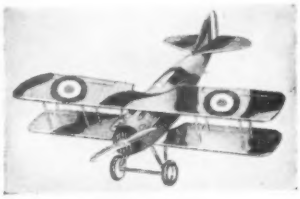
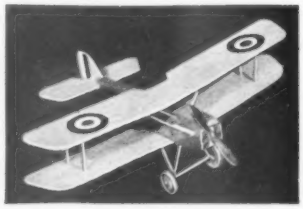
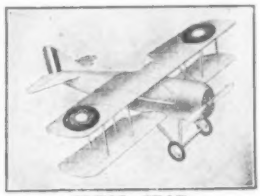


3—Ideal Spad

4—Laird Super Solution



5—British S E 5



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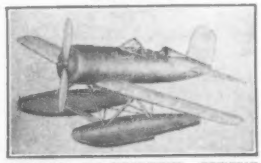

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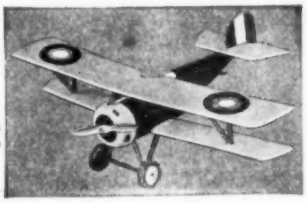
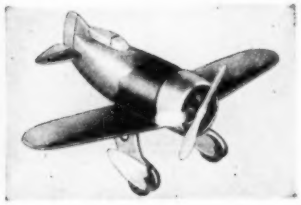


1—Nieuport Biplane



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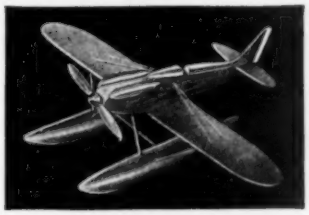
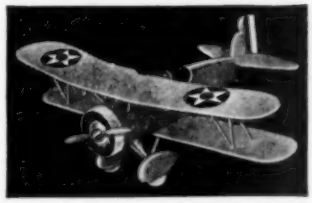
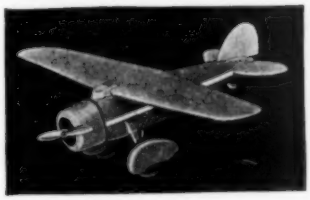


8—Napier SuperMarine

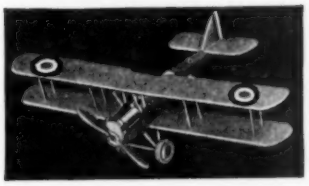


9—Curtiss Hell Diver



10—Lockheed Vega

11—Curtiss Hawk P6-E



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Feeding Favorites
(*Continued from page* 322)

University, and whose San Francisco office was Hoover's headquarters, is a director of the Fokker Corporation, a division of the powerful General Motors Corporation under its new name of General Aviation Mfg. Corp.

General Mason M. Patrick, former chief of the Army Air Corps, now a resident in Washington and director of the Aviation Corporation, probably is the most distinguished of the ex-service men who have become connected with the various aviation companies. Major Burdette Wright, former assistant of General Mitchell in the Air Corps, who resigned four years ago, handles the Washington affairs of the well favored Curtiss-Wright Corporation.

P. E. D. Nagle, ex-commander of the Navy air service, has charge of the Pan American Airways offices in the Barr building—where the Republican National campaign committee also has headquarters. James Murray, an old time postoffice department flyer, represents the Boeing interests. Haines Hinshaw, formerly a publicity man connected with Herbert Hoover, handles public relations for the Aviation Corporation with commodious headquarters at the Carlton Hotel.

OFFICERS and directors of the few favored firms which virtually monopolize most of the government's air appropriations also completely control the Aeronautical Chamber of Commerce of America, Incorporated, which unofficially has a great deal to say as to prevailing aviation policies in Washington —especially with members of Congress.

F. B. Rentschler, president of the Aeronautical Chamber of Commerce,* is a director of the Pratt & Whitney Aircraft company as well as of the Pan American Airways and the United Aircraft and Transport Company. One of the Chamber of Commerce vice-presidents, is Paul Henderson, counsel for the United Air Craft. Another is J. T. Trippe, ex-Naval aviator who is president of the Pan American Company and director of several other aviation concerns.

G. B. Grosvenor, a director of both the Aviation Corporation and Pan American Airways, is another vice president. H. M. Hanshue, another vice president of the Aeronautical Chamber, a director of the Hollywood National bank, is connected with the Fokker Aircraft company and three Pacific Coast air transport companies.

Of the twenty-seven men who compose the governors of the Aeronautical Chamber of Commerce, ten are directors of aviation concerns specializing in government contracts.

The aviation companies, with intimate relations with the government, are also ably represented on the National Advisory Committee for Aeronautics, which has its headquarters in the Navy building.

*Although Rentschler is listed as president in the latest Aircraft Year Book (1931), he has since been succeeded by Charles L. Lawrance, formerly Vice President of Wright Aeronautical Corporation.

Army and Navy procurement officials attempt to justify their policy of granting non-competitive contracts to a comparatively few firms by declaring that these concerns "have spent millions in experimentation and have displayed superior creative ability."

These seem to be stock alibis in the Army and Navy departments, but the facts remain that *General William P. Mitchell declares that there is not a single* 500 *horsepower engine in an American fighting plane, and General Foulois admitted it might be our duty to buy engines in Europe.*

CONGRESSMAN Melvin Maas of Minnesota, an expert war flyer himself and one of the foremost advocates of a really first class air service, is one of the open critics of the present policy.

"Our present air mail situation is deplorable and disgraceful," Congressman Maas told me, "and although we are spending more than enough to have the best aviation service in the world, unfortunately waste, duplication and the pernicious influence of the lobbyists is putting us behind in the world race for air supremacy.

"Furthermore," says Congressman Maas, "our present system of giving practically all the contracts for military planes to a few favorite firms might easily result disastrously in time of war. As matters stand, we now are having most of our planes turned out by four or five factories. Presumably an enemy would know this, and in case of war attempts would be made to destroy these factories.

"Personally, I think we would be far better off if we standardized our air equipment and farmed out its manufacture to the industry as a whole instead of confining the contracts to a few selected firms."

In my next article in POPULAR AVIATION, I shall describe in convincing detail some of the wasteful methods habitually employed by Army and Navy procurement agents under non-competitive contracts; show how certain favored firms are benefited by government appropriations for "experimentation"; expose part of the endless duplication; tell how both the Army and Navy are heavily over-balanced with expensive observation planes instead of purchasing pursuit, attack and an adequate number of training planes.

I will also quote competent Congressmen to expose the military inefficiency of the costly Zeppelin program, and finally reveal the hidden and sinister influences that thus far have prevented Congress from exposing the whole rotten situation and compelling the creation of a new Department of National Defense, which alone offers the slightest hope of providing this nation with genuine aviation preparedness.

And I also shall have considerably more to say about the amazing monopolization of the air mail subsidies, which in itself is a shocking and shameful story and a story backed by irrefutable facts.

END

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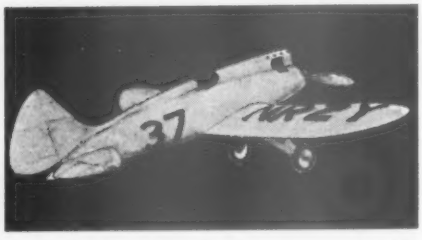

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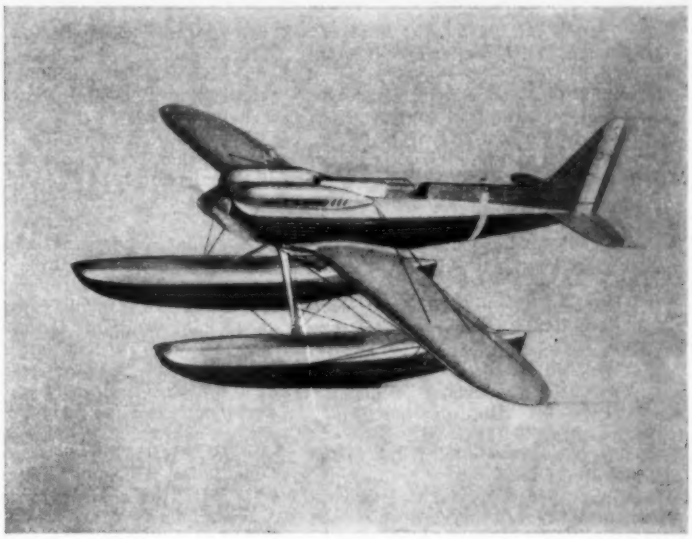
All pictures on this page are of the actual Cleveland-Designed Models themselves. We NEVER use pictures of the big ships.



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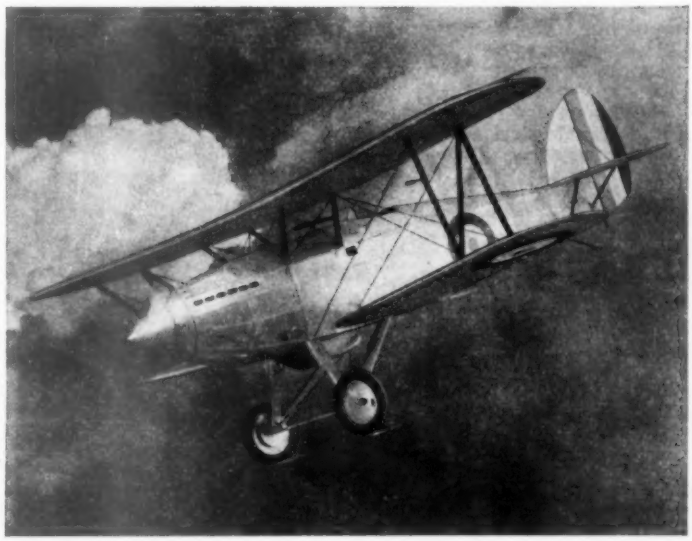

THERE'LL be a crowd of aeromodelists let out a cheer when they know they can get this powerful "beaut" of a model. It is an ingenious miniature of England's well known intercepter fighter (which has been credited with a screeching 205 m.p.h. performance). The masterly made Cleveland-Designed model is colored gleaming silver (with Cleveland's new pigmented *model* dope). Standard English insignia are supplied. Licensed numbers, squadron insignia of your pet squadron, etc., may be added if desired. Kit comes as all Cleveland ¾ in. scale Kits do, complete with all materials needed, all parts requiring machine work, fully completed. Span 22½ in.; length 19¾ in.; weight 2.6 oz. Complete Kit SF-20, **only $2.50** postfree. (Customers in Canada and other foreign countries, add 38c for foreign service charge). Send your order in at once—spring a surprise on your friends.

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This Kit of Ben Howard's Racer met with such a demand that we are now able to offer them to everyone for price of $1.00 indefinitely. It's a honey for flights and looks. Span 15 in.; length 13¼ in.; weight 1.3 oz. Colored with Cleveland's new white dope. Complete Kit: SF-18. Send for yours today.

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EVERYWHERE you hear aeromodelists saying this about Cleveland-Designed models. And every one of the pictures on this page are of these actual models, staged against a natural background. Even as strikingly real as these pictures show these models, they fall far short of the true beauty of the models themselves in their colorful trimmings and stunning symmetry. (Ever photograph one yourself? Try it out and see). Every Cleveland Kit brings you everything needed to build these master models—for Cleveland Kits are the last word in completeness.

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THE deadline on this extremely low price is April 30. No orders will be filled at this price if the envelope is postmarked later than April 30, 1932. After that the price goes up to its regular figure of $1.50—and all orders received with a later postmark than April 30 with only $1 enclosed will be held until the balance is sent by the purchaser. *So act quick!* Hundreds of Cleveland-Designed Gee-Bees and Howard Racers were sold the first few days of our April announcement. Everyone is crazy about them. Hurry, if you want to get an honest-to-goodness bargain! Scale ¾ in.; span 17½ in.; length 12 in.; weight 1.5 oz.; yellow and black; flies beautifully. Instructions for all lettering (not shown on photo) supplied. Order Kit SF-17.

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We will send, free, to anyone interested in model aircraft, information of vital interest if you have never received literature from us previously. We have 40 wonderful models to tell you about—only four are listed here. It will cost you absolutely nothing unless you do wish to send a 2c stamp to help cover mailing costs. (If you wish to write a letter instead of sending coupon, do so). Tell all your friends of this, too, for we want to know of everyone interested in building good models.

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CLEVELAND MODEL & SUPPLY CO.
Model Engineers Since 1919
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XUM

Answers to Official Mechanics' Exam

(*Continued from page* 301)

A. The height must be at least 4/5 of the mean chord, or not less than 30 inches.

Q. What are the requirements relative to the placarding of baggage compartments in licensed aircraft?

A. Baggage compartments must carry placard showing maximum load for which they have been approved by the Department of Commerce.

Q. When must a navigation summary report be submitted to the Secretary of Commerce?

A. On Jan. 1st and July 1st of each year for all licensed aircraft. For planes on scheduled operation report must be made on 20th of each month.

Q. How shall a serious accident be reported which results in serious injury to persons?

A. By telephone or telegraph to the Secretary of Commerce.

Q. What procedure is necessary in repairing a licensed aircraft which has been seriously damaged before the license can be continued or be renewed?

A. Reported by the owner or pilot to Secretary of Commerce on a form provided for that purpose, and must not be flown until the repairs are approved by a Department of Commerce inspector.

Q. If a component is damaged more than 50 per cent, what procedure is necessary?

A. The rebuilder will be required to submit to the Department of Commerce drawings and stress analysis of the parts to be repaired. The drawing and stress sheets will not be required if repairs are made by original builder.

Q. Does it make a difference if the repairs are made at an approved repair station?

A. Yes. The stress sheets and drawings will not be required if repairs are made at an approved repair station.

Q. What constitutes a line inspection?

A. An inspection of the external parts and parts that can be inspected through apertures or windows. This includes the engine.

Q. When is a first aid kit necessary on a licensed airplane?

A. When carrying passengers.

Q. Is a fire extinguisher on all licensed aircraft a requirement?

A. Yes.

Q. When is a gasoline gauge required on a licensed airplane?

A. Always.

Q. Who is responsible for signing the log when repairs are made to a licensed airplane?

A. The mechanic making the repairs.

Q. What equipment and facilities are required in order for a repair station to be approved to repair welded tube structure, excluding fittings?

A. All repair stations approved for repair work on welded steel tube aircraft structure shall have the following facilities, equipment and supplies. (A) Acetylene welding equipment with proper assortment of torch tips and supplies. (B) Portable buffer. (C) Bench and vise. (D) Emery wheel. (E) Hand tools, including hack saws, clamps, micrometers suitable for both tubing and flat stock, level, and full set of reamers. (F) Adequate supply of all sizes of SAE-1025 and SAE-4130 tubing and sheet. (In stock or readily available). (G) Suitable facilities for determining the character of material to be repaired or replaced. (H) Supplies and equipment for painting and applying protective coatings.

Q. Is it necessary to carry the log book in a licensed airplane when making cross-country trips?

A. Yes.

Q. Are electric landing lights required on licensed airplanes used only in transportation of mail at night?

A. No.

Q. What is meant by a periodic inspection?

A. An inspection by a licensed mechanic made to determine the working condition and state of repair of engine installation, control system, proper alignment and fuselage details.

Q. When is a periodic inspection made?

A. After every 100 hours of flying.

Q. Is an applicant for mechanic's license required to pass a practical as well as a theoretical examination?

A. Yes.

Our next installment of the mechanics' exams will cover the engine and its accessories.

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Model Ideas

(*Continued from page* 316)

were painted on the sides of his machine, but these were removed some time later following a dog fight in the air, when enemy bullets punctured the fabric, necessitating repairs. Following this, "B E R T" became the distinguishing characteristic on his Nieuport. Nungesser used, as his decorations, a skull, cross-bones, a coffin and four burning candles.

The Cigognes, or Storks (technically called N-3 and S-3 depending on whether Nieuports or Spads were used) that downed more than 300 enemy planes and had as members Fonck, Guynemer and Nungesser, used a stork as their "signature". In addition to using as an emblem that long legged bird, the youthful Georges Guynemer, who was credited with more than fifty victories, called his steed of the air, "Vieux Charles".

That popular cartoon character of George McManus, Jiggs, carrying a bomb, served as the trade mark of the 11th Aero Squadron. The Spad used by Capt. Eddie Rickenbacker had a red nose, yellow wings and struts, green fuselage, red, white and blue rudder, green wheels and yellow landing gear.

The Germans also tried to outdo their opponents with their multi-colored and grotesquely striped planes. Those used by Von Richtofen's Circus had red noses, the Lozier Circus had yellow bellies and other jagstaffels preferred checkerboard fuselages.

Lieut. Oswald Boelcke, one of the leading airmen of the other side, liked to have a black plane with white crosses instead of the customary dark crosses on a light field.

END

Practical Lessons

(*Continued from page* 314)

mushed through about 300 feet (Position 4), and then I nosed her down in a steep glide to recover flying speed (Position 4). After she had the speed, I flattened out (Position 5), and here we are—in much better shape than your friend Smith."

"You see, Bob, that Smitty pulled out quick and got knocked coo-coo for a couple of seconds, which was just long enough to get him into a whole lot of grief. Just as a little sense was creeping back into his skull after the knock-out, he nosed her down for recovery—but it was just a shade too late. You are bound to lose some altitude before you can get straightened out from the mush because she don't start moving forward right away.

"All right, son, take her over and we'll do it all over again, including the power dive stuff unless you're convinced that you are wrong. Climb her up to 5,000 feet this time because there's a green hand at the stick. And while we're walking her upstairs, I

got a load on my chest that I'm going to deliver to you in a package.

"In the first place, don't jerk a ship out of a dive unless you know positively that she's strong, healthy and able to stand the racket. Unless you have an Army pursuit ship or a Hell Diver, the wings may decide to part company with the ship. The stunt we just pulled was enough to crack a bunch of oak two-by-fours—but old No. 7 is built for this kind of work. Not built for speed but good and husky."

"But what about that crack-up on Friday?" queried Bob. "I've just had one mighty useful demonstration, but I'd like to know what happened to Robbins when they sunk the OX-5 into the ground. I understand that they had just taken off when it happened. Give me the dirt on this."

"It's the old story all over again, Bob," explained Ed. "Some genius in that camp started a spiral climb without sufficient power, and they flew the spiral on such a small radius that they got into a spin. They tightened up the spiral until they got one dead wing—and then down they came.

"You see, they got off, all right, and then started to get the dizzy idea that they would make a spiral climb, starting close to the ground. Even this would have been all right, if that had spiralled up with a good radius, but no, they had to do a tight one with about a 200 foot radius, just to make it hard. Maybe some day, they'll learn to fly over at that joint. And perhaps not.

"You see, when the ship is flying around a circle or spiral of very short diameter or radius, the inner wing travels much slower than the outer wing tip, hence the lift of the inner wing is less than that of the outer surface. The inner wing tip drops, and they go into a spin. If they are close to the ground, without a chance to recover before they hit—well, it is just too bad for someone. And that's just what happened to these birds."

This is illustrated by Fig. 4 in which a ship is shown in three successive positions while it is flying around a circle or spiral. The inner wing tip is (S), while the outer tip is at (R). It starts off at (1), and by the time the ship reaches (2), the inner tip has lost so much speed that it is starting to drop. At position (3), the ship is way over on her side so that a spin is inevitable. When flying in a larger radius, the difference in the wing tip speeds is much less with very little chance of an accident, providing that the engine has sufficient power to carry the increased load.

"And another thing, Bob, the ship is just as subject to this trouble when spiralling down as when climbing. Just get into a small enough or tight enough spiral, and one wing is certain to drop. If the ship is near the stalling speed when this happens, then just start thinking how you will get out of the spin—for it is bound to happen."

END

Century is Wrong

(*Continued from page* 306)

designed purposely so lax that they would not hinder the progress of general aviation. However, it was recognized at the time that there would be minimum requirements and left the latitude of actual standard to the operators themselves, knowing they would be raised to as high a point as their experience prompted.

This can only come from thousands of hours of flying transport airplanes. Securing a transport license from the Department of Commerce does not alone give the qualifications for securing a post as pilot on any of the recognized air lines.

Here are the words of Assistant Secretary of Commerce for Aviation, Col. Clarence M. Young: "The Department of Commerce is very glad to have such an Association as yours which gives it something tangible to reckon with, with reference to the welfare of the pilot and especially that of the air line pilot."

Many pilots, not yet members of our Association, have refused to work for Century under present conditions. It is this mental hazard which we have attempted to warn against.

Unfortunately, we are faced with the horrible fact that two new pilots have been killed on the Century Lines and three others seriously injured indirectly as a result of the very conditions we have repeatedly warned against.

Strike-breaking underpaid pilots cannot exercise instantaneous and accurate judgment in case of trouble or when bad weather is encountered. They have constantly before them the mental picture of the conditions under which they are forced to work. They realize they are strike-breakers, and they realize they are underpaid.

END

Century is Right

(*Continued from page* 307)

on and on. Please accept these remarks in the proper spirit, and endeavor to see both sides of the picture! I would greatly appreciate it if you would publish this in your next issue of POPULAR AVIATION.

I am LOIS F. BEARD,
T. P. A. E. Mech.
St. Petersburg, Fla.

END

Purcell

(*Continued from page* 298)

him. He has no horizon to fly by and no visible mark below him. And ladies and gentlemen, a lonelier feeling than this,—there ain't none.

He puts the ship on the compass course and watches his instruments. He watches his bank and climb indicator in the dim glow of the dash light until his eyes get tired. This little light on his instrument board gives him a friendly feeling and also an idea. He switches on the landing lights out on his wings and through the billowing clouds they are faintly visible.

He looks ahead. A light appears below and swings to his right in a circle, through a hole in the fog. Every storm has these holes, allowing minute glimpses of the ground below. It is these same holes that give a pilot a break during a storm. Sometimes ships will circle an airport waiting for one of these to appear so that they can dive through and get under the ceiling.

Our pilot gets back to his instruments and finds that he is in a slow spin. This is corrected and several moments later he is again on his course. His speed is around one hundred and thirty miles an hour as he has a schedule to keep up.

Now just let your imagination roam for a minute and think of traveling one hundred and thirty miles an hour in the dark and through a blinding storm, and then try and place yourself in the pilot's place and do it for one hundred and fifty dollars a month as certain airlines in the country are asking the pilots to do. Our pilot calls a field about fifty miles ahead for a weather report.

"So-and-so, in thirty-six, calling Civic Center—go ahead."

He listens and waits—no answer. He repeats the call several times and finally gets his operator. He asks for a weather report and wind direction and is given both of these. He is told that the field is closed in. The radio man tells him that everything else along the line is in pretty bad shape for a landing. In other words, zero ceiling.

He cuts off the radio man and flies on. It is now time for him to make a slight correction in the compass course to take care of the drift of his ship. This is done by figuring the direction of the wind just given to him by the radio man at the field he just called and if the direction of the wind through

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which he is flying is not the same as the field he called, well—it's just too bad.

He gets all the ceiling he can, that is, he flies as high as the ship will climb (and don't forget that a ship may be overloaded) and sits back and watches his instruments. With the aid of some mental gymnastics he finally decides he is over the mountains, one of the worst parts of the run. Again he looks ahead and sees nothing but misty clouds. The motor misses a couple of times and he plays with this for a few moments. He finally is forced to give up a thousand or so feet of his altitude and cut down some revolutions on his motor.

Everything seems to be going along great. The ship is on an even keel and he decides the only trouble he is going to have is to find the airport at the other end. He remembers a compass course from an air beacon near the field on which he is to land that might be sticking up through the storm, and decides to take a compass route from that and everything will be rosy.

CRASH!

OUR pilot made a bad guess on his wind correction and a bad move in losing altitude, with the result that he kissed a mountain traveling at the rate of one hundred and thirty miles an hour; a mountain that he thought was at least a hundred miles from his present course. It would have been if the wind direction of the ground station had been the same as the wind he was flying through.

During clear night flying or clear day flying this accident would not have happened in a hundred years, but in this type of flying, everything depends on Lady Luck, and like all women, she's fickle. If the pilot had followed his first judgment and refused to fly the aviation industry would have been better off. When an old-timer meets death in this manner people sit up and take notice. When a youngster dies, it can be charged up to lack of experience.

Our pilot's death was painless so we will leave him there until found. This will probably be in a couple of days. The airline for which he was flying will report to the civil authorities some twelve or fourteen hours later that he is lost. They would know of this event during the next two hours at the most, when he failed to answer his radio calls from the ground, but for some reason or other, civil authorities will not be notified until this time. Why? Your guess is just as good as mine.

Now in case you would like to know how this can be stopped, the author is going to shove in two-bits' worth more and say a few little things.

First, the Department of Commerce will have to increase the air hours of pilots flying ten passengers or mail by issuing a Master Pilot's license. This license should call for at least three thousand hours of transport time and should entitle a pilot to fly any transport plane in existence. The Government could help by insisting that only Master Pilots be allowed to carry Government mail.

This would eradicate a competition between the youngsters and the old-timers, a competition that is being kept alive in the aviation industry today. The bigger lines seem to be able to stand their crack-up losses, but how about the smaller airlines who have to bear the brunt of the publicity of the big line crack-ups. These smaller lines have good pilots, most of whom have never had a crack-up for the reason that the pilots fly the ships, not the ground personnel, but these smaller lines suffer more from the passenger fluctuations than do the big lines who carry mail.

UNCLE SAM is a good customer, he pays nice fat rates for his mail, and air mail lines don't give a hoot if they never have a passenger. Our smaller lines operating on nothing but passenger fares take all the grief of the newspaper publicity given to the bigger air lines after a crack-up on those lines, especially when the manager of the mail line gives a far-fetched excuse to explain the crash of the pilot.

The real conversation which occurred before the flight between the manager and the pilot, is never published. No one ever stops to think that the pilot may have had numerous objections to the flight in the first place, but in order to keep eating and to keep that name of "weather pilot" as far from him as possible, he attempted the hop, with the knowledge that his number was up. By every rule in the book, of such is the stuff that heroes are made.

I would also like to see graduated licenses from the Master Pilot's license who can carry any number of people, down to the transport license who should be allowed to carry not more than two people. Each separate license should only allow trips of so many miles with paid passengers, with the pilot graduating from one license to another when the preceding license time had been flown without undue accident. This could be worked out by the powers that be to the satisfaction of all concerned, but it will be fought tooth and nail by several of the larger companies. However, several hundred short line air companies in the United States would like to see something similar to this for the simple reason that they fully understand that crack-ups would be fewer and bank deposits greater when a pilot is allowed to fly his ship.

I would also like to see a law passed that would fine or imprison any of the ground personnel who try to influence the decision of a pilot as to the safety of a certain flight, or while flying his ship in the air.

I would also like to see some teeth put into the Air Commerce Act regarding the testifying of employees before a legitimate investigating board after an accident.

I would also like to see a law passed that would give a pilot the right of way on the radio. That is, that he would not be bothered during flight with a lot of unnecessary calls from the ground station such as, "Have you got an inter-office mail pouch for us"? or "did you bring my coat from whoosis"? or "we think you'd better go three thousand feet higher, the flying conditions are better". Radio is put in the ships for the safety of the passengers and pilot, and not for inter-office communication. A pilot cannot fly a ship through a storm, especially an overloaded one, and answer a lot of fool questions at the same time.

THE final law I would like to see passed: A fine and imprisonment for the OWNER of any air line who sends out overloaded ships. This is another thing that the smaller lines never do, but the big outfits seem to be able to get by with murder. Overloading reduces the ceiling of a ship and ceiling is something that a good plane needs lots of, if it is to retain its factor of safety.

Maybe they'll pass some of these laws and put teeth in them when the author is an old man, but anyway he trusts that reading this article you will be more qualified to sit on one of these "investigating committees" with a little knowledge of what it's all about. I also feel that I have helped the aviation industry at large by explaining just how an accident can happen to an old-time pilot under the present conditions.

Flying itself is not dangerous if kept in the hands of flyers. A gun is not dangerous if in the hands of someone who understands guns. Both are dangerous when in the hands of half-wits and infants. When these half-wits and mental infants are removed from the flying game by legislation, then and only then, will the grand old industry come into its own. Government legislation along with a complete flying personnel is the one big cure for aviation, and the sooner the lines realize that, the sooner will the people have more faith in this baby of the Twentieth century.

END

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Confessions

(*Continued from page 305*)

us in getting out of the cockpit. I was in the sixth plane with Cap. Vieytez as pilot. When I saw the boys ahead of me getting out of their cockpits, I started to do the same thing. All went well until I was ready to jump, then things began to happen. Casually I turned my head, before jumping, and what I saw stoped my heart's beatings.

I saw the boy on the seventh plane ready to jump, but in some way or other he pulled the ripcord of a chute before jumping. The chute's silk was caught immediately by the terrific airstream and became entangled in the empenage. The plane started a crazy dance all over the sky, and turning in a steep bank, faded away.

I was becoming very tired, so being all ready to jump, I tried to do so but my mec. was so scared that he held his grip on my arm and didn't let me go. I shouted at him, in vain of course, so I tried to free myself, and after a short struggle I managed to do so.

I landed in a strange and dangerous field some nine miles out of the landing field. The field where I landed was thickly covered with "magueyes," a sort of cactus that have as many thorns as leaves—thorns from 3 to 6 inches long and point upward! It was a close call if you ask me.

I expected, on my way back, to find the guys on the seventh plane all dead, and was worrying about it. To my surprise, I found that Carlos and his mec. were lucky enough to recover the 'chute.

MAJOR BORJA, one of our oldest and ablest pilots, at first thought that the best thing to do was to jump for his life, for the plane was getting out of control. Then he remembered that the mec. wasn't wearing a 'chute, so he remained there, doing his best to keep his plane level and at last they landed sound and safe. Have you heard of a similar case? If so let me know about it.

In the same month of May, 1931, we attend an air show at Mexico City. We made many jumps, some at night and with us were Billy Brown and Bill Dodson, of the Russell factory. At this show, for the first time in my life, I made a jump from a closed cabin ship and with a Russell 28 ft. it was as easy a jump and a soft landing I never expected. Then Carlos Paullada made our hearts stop again!

He was due to make the double jump so he went up in a Vought Corsair some 7,000 ft. over the field. He was wearing a Russell 28 ft. seat-pack and a Irvin 24 ft. lap-pack. He opened the Russell first, then he cut loose from it and didn't open the lap-pack until he was some 200 ft. or less from mother earth! Some of us that were supposed to be hard boiled, turned our faces away and some of the girls in the stand fainted. He latter explained that he had lost the ripcord not finding it until the last moment!

Then other of the boys, named Miguel

Franco (killed recently), jumped with a Switlik. The factory representative told him not to delay the drop. First jumped Billy Brown, then Miguel followed, but in order to come level with Billy, he delayed the drop a bit. He pulled the rip-cord, the 'chute opened and then the 'chute began to tear from the skirt all the way up. Of course, the boy, seeing the big tear and feeling his great speed downward, got busy tying two shroud lines so to reduce the tear. He landed a little hard but otherwise safe.

In spite of all those happenings we still look at chute jumping as at the greatest sport of them all.

Yours for a happy landing,
Abraham Murillo, Jr.
Cuernavaca 35. Col. Condesa,
Mexico City.

END

Blind Flying

(*Continued from page* 288)

at the same time as the turn indicator. Any tendency to lag or stick in one position should be carefully noted. The number of degrees which the compass continues to rotate after the plane has stopped turning should be noted. If the compass is steady, and shows no inclination to spin, there is little likelihood of its doing so later.

Before taking-off, the altimeter should be carefully set to the exact altitude of the point of take-off. The adjustment should be stiff enough so that the dial will not be turned from the correct setting by the vibration.

The rate of climb indicator is very important. It should be carefully checked to see if the needle is slightly above or below the zero when the airplane is in level flight. Note also if there is any tendency to lag, and how much.

Airspeed is most important. This instrument should be checked and the readings noted when the airplane is in level flight at normal cruising r.p.m., in a normal climb, in a steep climb, in a near stall, and when in a normal glide with power off.

THE zero reading of the bank indicator should be noted when the airplane is flying level. Sometimes the ball may be slightly off center. Try moderate slips and skids, then violent ones in order to see what condition is indicated by any position of the ball. It is also well to see if the ball can stick at either end of the tube.

If the airplane is equipped with an artificial horizon, it is well to note how long it requires after take-off for the gyro to pick up speed and the instrument to begin to function. Find to what degree the altitude of flight, speed, and load change the position at which the horizon indicates level flight. He should try various angles of bank and climb to determine angles at which the instrument ceases to function. Once the gyro has been thus thrown out of position, note how long it will take to return to normal.

Every airplane has its own peculiarities of control. Different types of airplanes vary widely in this respect. Even among a number of airplanes of the same type the individual airplanes will be found to have their own characteristics. The degree of longitudinal, lateral and directional stability may vary slightly. One may be left wing heavy, another right wing heavy. The dispositon of the load very materially affects the control characteristics. If the airplane is of a type which necessitates considerable use of the rudder in rough air the amount of pressure or rudder movement should be noted.

The ability to use and coordinate these instruments can only be acquired through experience in the air. In a special airplane such as the special plane with hooded cockpit mentioned above (and with a safety pilot), the beginner can acquire the necessary skill and confidence to fly entirely by his instruments. The first step is for him to cut himself off from the reactions of his senses, on which he has been in the habit of relying.

This is easier said than done. It will take a little time for him to overcome the impulses which say, "You are turning to the left," while before him the turn indicator shows a very healthy turn to the RIGHT. After believing the instruments a few times and finding that they ARE RIGHT the beginner gains in confidence and slowly but surely he acquires the ability of shifting quickly from instinct to instrument.

POSITIVE action and smooth application of the controls is the secret in flying by instrument. Tranquility of mind is equally important, if not more so. A pilot flying blind must be absolute master of himself as well as of his airplane. There can be no indecision. When the instruments show that the airplane is deviating from its course or in any way changing its attitude the pilot must instantly and subconsciously convert the readings of the instrument into a mind picture of what the airplane is doing. The proper movements of the controls to correct such deviation should then be instinctive.

The only difference from horizon flying is that in this case the pilot received his knowledge of what the airplane was doing from his instruments instead of from his senses. The ability of a pilot to control his airplane instinctively on the strength of what his instruments tell him, disregarding without conscious effort the impulses of his senses, is the mark of a real instrument flyer.

All maneuvers while flying by instrument should be accomplished gradually and evenly. Sudden or large movements of the controls are to be avoided. A pilot must learn to differentiate between the jerky movements of the instruments caused by rough air and the slow steady movement which indicates that the airplane is beginning to turn, climb, descend, or in any way deviate from straight level flight. Steady pressure on the controls should be used to bring the instruments back to zero or to the desired reading.

After a pilot learns the fundamentals

of instrument flying he usually develops a technique of his own. A pilot may use the compass to the exclusion of the turn indicator, or vice versa. Some pilots pay comparatively little attention to the bank indicator so long as no violent slip or skid is indicated.

In correcting for turns some pilots do so with the rudder almost entirely and then correct for the resulting slip or skid after they have the needle of the turn indicator steadied down on zero. To maintain level flight after setting the throttles one pilot will favor the airspeed meter. Another may depend largely on the rate of climb indicator. The methods employed are merely the means to an end. If the desired result is obtained, the means employed should not be subject to any cast iron rule.

Except in emergency, instrument flying should not be undertaken unless the pilot has complete knowledge of the weather conditions between himself and his destination, or of an intermediate landing field at which he is assured of a safe landing. In these days of radio, blind flying for any period should not be undertaken unless the pilot is in communication with the Department of Commerce radio stations.

WITH the exact weather reports and marvelous forecasting service which are available today along the major airways, there is no reason why a pilot should not know in advance whether he may have to fly blind during parts of his flight. If it appears that he may have to do so he should plan exactly what he is going to do and have a course of action clearly mapped out in his mind before beginning to fly by instrument. Nothing should be left to chance.

He should be satisfied as to the perfect functioning of his engines and the airplane itself. All instruments should be carefully checked before he "goes blind." He should check his fuel supply and be certain there is enough, with a safe margin, to take him to an area where the clouds are broken and there is ample ceiling over a good field to insure a safe landing.

Through the use of radio he should keep a record of the weather reports received every fifteen minutes. If at any time conditions change so that he has any doubt about effecting a safe landing at the point he has been planning to reach, he should proceed to the nearest area of broken clouds and, after regaining ground contact, proceed to the closest emergency field and land.

The so-called hazards of blind flying are daily becoming less. The bug-a-boo of falling off into spins has almost become a bedtime story. As a matter of fact, the spin has never been the real menace to blind flying. A spin, once it starts, cannot be mistaken for anything else, and a stable airplane, left to itself, will come out of a spin unaided. The menace in blind flying has been the tight spiral and the power dive. With dependable instruments, carefully maintained and adjusted, a properly trained pilot need have no fear of getting into either a tight spiral or a dive. On top of these facilites the Department of Commerce has provided the radio beacon, which solves the problem of navigation.

Three obstacles now confront the airplane in achieving complete victory over conditions of no visability. The first is that of ice formation on the airplane when the temperature and moisture content of the air are within the narrow limits causing this phenomena. The solution of this problem is believed to be the adaptation of heating elements to the entering edges of the wings and the airspeed pitot tube, together with provisions for driving the gyros of the turn indicator and artificial horizon independent of air stream.

The second obstacle is the fatigue frequently experienced by a pilot due to prolonged periods of instrument flying. The robot, or mechanical pilot, is now operating successfully. This appears to be the answer to the problem of pilot fatigue and promises to go even further as there is no reason why it cannot be hooked up with the radio beacon to guide the plane on its course.

THE third obstacle is that of effecting blind landings. This problem is actually not so much that of landing the airplane entirely by instrument, as it is one of guiding the plane into a field at such a gliding angle that the airplane, when a hundred feet or so in the air, will be at the edge of the field and headed into the wind, with an unobstructed landing area before it. The occasions are very rare when the ceiling over an airport is less than 50 to 100 feet. The development of local radio beams marking airport runways, with auxiliary beams to guide the pilot in making his glide, plus the sonic altimeter which tells the pilot his exact altitude over the ground, all point toward the solution of this problem in the not too distant future.

The transport company realizes that these adjuncts to air transport operation are already in sight. They are, in fact, just around the corner. The degree to which they can be employed hinges on the ability of the pilots to fly by instrument. All their pilots have been given a thorough course in instrument flying. The pilots flying the 23-hour night mail service between New York and Los Angeles are relying more and more upon their instruments. The percentage of completed schedules has been increasing steadily. So far, the

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LEONARD HICKS
Managing Director

use of instrument flying is restricted to non-passenger flights. However, the pilots flying the regular passenger service are being given constant training in the art of instrument flying and they are accomplished in its use. When all of these developments have been brought to perfection and coordinated to the point where absolute safety and dependability are insured, then the operating organization of various airlines will be prepared to utilize them.

END

Training Camp Experiences

(*Continued from page* 290)

squared off the rudder bar, and tugged gently on the joy stick, he had the pleasant sensation of feeling his plane straighten out in flight though upside down. So, hanging there with his head between the plane and the earth, he put the De Haviland in a glide and swept toward the ground—not far away.

The witnesses of Hand's peerless bit of flying looked on fascinated and horrified. Even if he could keep his plane in control, he and his student would be ground to bits between the earth and the plane at sixty miles an hour. The airmen's bodies were, of course, protruding from the inverted fuselage and would be the first thing to hit the earth after the top wings were snapped off.

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But their bodies did not hit first. Master of the situation to the last, Hand seemed to on-lookers to throw one wing lower than the other so that, in striking the earth first, it broke the force of their forward speed. Hand had a few insignificant bruises, and his worse injury, a slight fracture of the right arm, he sustained in dropping out of the cockpit after the plane had come to rest. The student had some minor scratches.

Without having seen Issoudun at the time—all the numerous fields operating full blast—one can form no idea of the immensity of the place and of the swarm of machines that packed the air. The great number of planes added to the hazards of flying.

ON DAYS when the visibility was poor, planes were a constant menace to each other; yet training had to proceed unless the risk was considered practically suicidal. Our army in the field was growing every day, and the plan of organization called for large numbers of airmen, most of whom Issoudun was depended on to supply.

Lieutenant Hand's unbelievable escape from death followed a crash on a hazy day, but let me tell you of another that took place on a cloudless day.

At Field 8, student aviators learned sham combat work, trying to reproduce as nearly as possible for each other's instruction, conditions that would later confront them over the lines in real combats with the enemy. First, the student had combats with single planes. Later, he went into formation with others and met an equal number.

One day, two patrols of three each were scheduled to meet between La Champenoise and Levroux at a given altitude. They wheeled about for advantage in position and soon came together in a violent dog fight, mixing it generally.

As the fracas became intensely hot, a machine in the vicinity that was being pursued by an opponent, entered the dog-fight unexpectedly and speedily. He could not succeed in shaking his own adversary, so he decided to dive on the leader of one of the patrols of three. His adversary followed him, thinking that he was trying to escape by this clever ruse.

THE leader saw this outside plane streaking down on him, forgetting his own formation and dog-fight for a minute, attempted to escape the newcomer by zooming. But just as he zoomed, he put himself in the line of flight of the plane that was chasing his own pursuer. A crash resulted, the higher plane of the two taking away part of the upper right wing and the V-shaped strut that supported it.

The planes did not cling together but started fluttering to the earth like injured birds—each in its own way. Witnesses would not have given a penny for the pilots' chances of escaping death. One plane went into a tail-spin, spun to within a few feet of the earth and snapped out in such a way that it crashed in a virtually upright position. A broken ankle was the pilot's sole injury.

The other plane floated about, alternately spiralling and gliding upright. At length the pilot coolly sat it on the ground in a comparitively safe landing. One strange feature of the affair was that the respective numbers of the colliding machines were 313 and 323.

There is another remarkable experience—that of a student pilot—which I wish to relate to prove that the daring and bravery of American aviators were not confined to active service at the front. This airman's story involves another pilot, an instructor.

ON THE day of the unusual occurrence, the instructor told the pupil to meet him in the air at 5,000 feet and follow him in a series of maneuvers meant to demonstrate what combat flying was like. The student approached the instructor at the predetermined place and began to follow his plane through a set of involved evolutions. One right behind the other, they made climbing turns, tight virages, renversements and side-slips.

Suddenly the pupil dived at the instructor, expecting that he would get his plane out of the way as he had been doing thus far. Instead, through some miscalculation or faulty judgment of distance, the instructor held his machine too near the line of flight his pupil was taking and the planes collided.

The crash was a dirty withering one, a mile above the ground. The engine head of the student's plane, pushed by the tremeendous momentum gained in a long dive, crushed one wing of the instructor's plane. The one-sided machine dropped like a rock, and the instructor was never able to gain even a fraction of control. Unfortunately he crashed into the ground and was killed instantly.

In the meantime, the student was having grave trouble. In an airman's mind, the horror of a wreck in the air was exceeded only by the horror of having his plane catch fire. The jangling crash, followed by the sight of his comradé falling headlong, gravely demoralized the student. His machine floundered through the air, and he thought himself done for.

Just then he noticed that only the front end of his machine was damaged, and that the motor was entirely gone. A peculiar feature of the accident had been a cutting of the engine fastenings of his plane to such an extent that the engine had dropped from its place and fallen to the ground.

FOR a second he could scarcely believe his senses, then he remembered how shallow the cowl was for the Le Rhone rotary motor and how easy it would probably be to shear the rods that held it in the frame.

The student was amazed at the ac-

tion of the plane. It did not go into a spin, for the weight of the motor that would naturally drag it down into this evolution was absent. The machine simply wobbled uncertainly on unsteady wings, and it was evident that the loss of the motor, combined with the force of the shock, had destroyed all semblance of balance. The pilot had the uncanniest feeling imaginable. The plane sank slowly through the air, the wind whistling eerily through the wires.

As he floundered about towards the earth, the pilot made a discovery. He found that he could steady his plane by shifting his body so as to counter the loss of balance, and thus he succeeded in keeping the plane on a fairly even keel. He started a series of glides, controlled by shifting the weight of his body, and his cool and daring performance has few parallels in Air Service history.

In an instant, he had grasped the facts of his novel situation. He had realized that the plane's wings were originally placed to obtain a delicate balance, based on the motor's weight and other known factors. The motor being gone, there was no weight forward to drag the machine towards the earth, and this resulted in a slower speed for the plane and a tendency to stay nose high, finally slipping towards the earth on its tail.

END

Q & A

(*Continued from page* 310)

is 100 square inches, and the stroke is 12 inches, then the displacement per stroke is: 100×12=1,200 cubic inches.

If there are eight cylinders, then the total displacement is: 8×1200=9600 cubic inches. In a rough way, this indicates the horsepower output of a given size and number of cylinders of a given type of engine.

This may range in practice from 8.00 down to 3.5 cubic inches per horsepower, depending upon the efficiency of the engine. By raising the compression of the engine, and by super-charging or forcing mixture into the cylinders, the number of cubic inches per horsepower can be greatly reduced. A small cylinder is of course a great advantage in aeronautic engines.

* * *

QUESTION:—Joseph A. Barton, New Orleans, La. *What is meant by the word "acceleration" when applied to the take-off of a ship? How is this measured or calculated, and what effect has it upon the take-off?*

ANSWER:—WE will begin this definition by explaining the word "velocity". The unit of velocity is the distance traveled in a unit of time with a uniform rate of motion. Thus, if a body travels 100 feet in one minute, then its velocity is said to be "100 feet per minute". This assumes that the rate of motion has not been changed at any instant in its travels.

Now, if the rate of motion or the velocity increases, it is said to be "accelerated", or in other words—"speeded-up". In general, this is given in terms of the increase of velocity per unit of time, generally in seconds. Thus, if the velocity is increased at the rate of 15 feet per second, every second, then the acceleration is: "15 feet per second per second", or "15 ft. sec./sec."

The elementary laws of mechanics teach us that a force is required to accelerate or change the rate of motion of a body, hence the acceleration and the weight of a body call for a definite force applied to the body that can be determined by a simple formula.

Therefore, to speed up an airplane from a standstill in taking-off, means that the airplane is being accelerated and calls for a certain thrust from the propeller. To build up speed rapidly calls for a greater force than to build up speed slowly.

END

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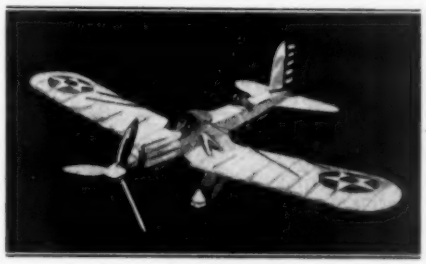

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Training Camp Experiences

(*Continued from page* 333)

REALIZING that he could not keep his plane on a perfectly even keel very long by his mode of shifting his weight, the student got another idea. He unfastened his safety belt, got his plane riding on an even keel, mounted quickly on the fuselage and stretched out at full length. It was a desperate measure, but he felt that it would enable him to distribute his weight to better advantage.

This whole thrilling performance had been observed by the pilot of another plane who followed the wounded machine downwards, unable to give the slightest aid. All he could do was gasp and hope that a fellow of such superb nerve and presence of mind would make a soft landing.

He watched the student hang on like grim death to the outside of a slick fuselage. He watched him steady his plane, continue his descent; knew that his principal control was the weight of his body thrown against a counter inclination of the unbalanced plane to flutter into a fall.

FROM the first, the pilot of the disabled plane knew that any panic or nervousness on his part would result in his death. In spite of realizing that the odds were so heavily against him, he manipulated the control stick of the plane with one hand and worked his body balance in conjunction as calmly as if he were only ten feet from the earth. Gradually the ground came up at him and shaped into a recognizable place.

He could see trees and open fields. Then he came even with the tree tops and skimming, along a few feet above the earth across a vast expanse, he made a landing so perfect that one might have imagined him to be a veteran of a thousand such incredible landings. His tremendous nerve and fine determination had won the day—and saved his life.

The pilot of the plane which followed him to earth was a wearer of the Croix de Guerre, had fought at the front where scenes of reckless daring and paramount bravery had become commonplace to him; yet he later stated that the feat of the student pilot was as remarkable for coolness and bravery as any he had ever witnessed. I doubt that any airman would find fault with his statement.

I have chosen these few incidents of the training field to show that flying during the war period was a hazardous and thrilling occupation, no matter where one practised it in France. Most American airmen loved the splendid thrills and excitement of the experience, and this accounts largely for the fact that we had a corps of distinguished aviators when Armistice Day rolled around.

END

Diesel Engine

(*Continued from page* 300)

valve-cam follower lifter under the inner end, lifting all the valves open at same time. It is only necessary to move the control plate to the extreme, to put the motor on decompression, and while in this position, the fuel is entirely cut off.

The control mounted through the accessory case, has an eccentric connected to the main control plate by a link. It is only necessary to move the control to the right or left to shift the main control plate to the desired position and thus maintain a given r.p.m. or decompression.

The fuel-pumps are mounted in the rear case in line with the pump-lever, and the fuel is supplied through drilled ducts. This brings the fuel to case temperature, which is very beneficial in handling lower gravity fuel in cold weather, and eliminates the possibility of fuel leaks.

The check valves in the head of the fuel pump, allow the fuel to pass into the fuel line, made up of steel nipples and high pressure copper tubing. This check stops any return of fuel, or air from the compression or explosion pressures in the cylinder.

The open type injector, which atomizes the fuel into the combustion chamber, is composed of three parts (1) the injector body, (2) fuel spindle and (3) the spray nozzle. They are easily dismantled for inspection or cleaning. The fuel spindle is inserted in the spray nozzle and has three 1/64 inch grooves cut in its tapered end to converge the fuel directly to the .020" hole in the spray nozzle.

The velocity of the fuel at full throttle, through this orifice, is approximately 807 feet per second which requires a pressure of 2,000 pounds.

The concentric head of the piston is relieved to coincide with the injector and allows the fuel spray to penetrate into the combustion chamber. The single valve is centrally located and the sinuous manifold is so designed that it causes the air to enter the cylinder in a whirling spiral motion on the suction stroke. The concentric head of the piston adds to this turbulence during the compression stroke.

The fuel is so injected into this turbulence within the cylinder that the spray leaves only slight deposits, showing a "question mark" spiral within the piston head pocket. After many hours of operating at different speeds, no appreciable amount of carbon was formed.

The sinuous manifold and valve-port are so designed as to give the maximum air turbulence to the intake stroke, and at the same time, overcomes the escape of exhaust gases through the front of the motor. The intake port opening forward, that receives the air, is flared and set at the proper angle to utilize the maximum pressure of the slip stream.

The exhaust port is to the rear and on the opposite side of the cylinder

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head. This was necessary to design the proper curve into the throat, or bypass opening, to force the exhaust gases through the exhaust port. The air flow is continuous through the port until the exhaust gases are expelled. Then the velocity through the throat and around the vertical baffle is increased.

Immediately the gases are started rearward, the intake stroke draws the fresh air, with its increased velocity around the baffle, into the cylinder with a swirl.

The crankshaft, master-rod assembly and crankcase are of the conventional design used in radial aircraft motors. An increase of from seven to ten per cent in weight insures the factor of safety over the increased loads and pressures encountered in Diesel power.

The motor operates with a compression pressure of 460 pounds, while the explosion pressure is well under 1,000 pounds. The vibration encountered over the operating range, are a minimum and not greater than vibrations in other radial aircraft engines.

There is very little friction to be overcome in the operation of the throttle, and while acceleration is very rapid, it is not critical. There are no new problems to confront the operator other than the use of one control instead of the usual switch, throtle, spark and air-mixture levers.

GENERAL SPECIFICATIONS

Form: Nine-cylinder, four-cycle, air-cooled, radial.
Rotation: Counter-clockwise viewed from the front end.
Rated Horsepower: 185 HP. at 1925 R.P.M.
Weight: 510 lbs.
Weight per HP.: 2.74 lbs.
Outside Diameter: 46⅛ in.
Overall Length: 34⅞ in.
Bore: 4⅛ in.
Stroke: 6 inches.
Displacement: 982 cu. in.
Fuel Consumption: 11½ gals. per hr.; cruising, 8½ gals. per hr.
Fuel Pumps: Independent plunger type mounted in the crankcase adjacent to each cylinder in a position above the cam and connected to the injector by high pressure tubing.
Fuel Circulating Pump: C-5 standard equipment.
Valves: Single valve located in the cylinder head dome.
Valve Mechanism and Operation: Push rod and rocker arm with roller over valve stem at valve end; clearance adjustment on opposite end of rocker arm.
Valve Spring: Conventional two-spring arrangement.
Crankshaft Bearings: Two roller main bearings at the center, one deep groove ball thrust bearing at front end; rear crankshaft bushing in accessory case.
Oil Pump: Two sections—scavenging and pressure. Oil pressure 70 pounds.
Starter: Eclipse electric inertia, series No. 7.
Generator: 12-volt conventional.
Tachometer Drive: Standard S.A.E. ½ engine speed, counter-clockwise.

END

Lowell Bayles

(*Continued from page* 292)

no other alternative but to attempt a landing among the trees. Bayles struggled manfully against insurmountable odds and, although his lady passenger escaped without injury, his plane looked as if it had been in a bull fight. This was catastrophe No. 2 in his life. He crated the sad remains of a once-proud ship, and trucked them back to Christopher. He then entered the mines to earn additional capital.

IN THE fall of 1927, approximately a year after the above event, we find Bayles and Jim Lewis, a pioneer mid-western flier, barnstorming the southern states. While in Florida, he met Rosco Brinton, a veteran flier from the east. The friendship ripened and, in the spring of '28, these two men organized the Eastern Aircraft Company, with bases at Springfield and Pittsfield, Mass. Here they trained students and sold Commandaires, a biplane then being built at Little Rock, Ark.

This was an adventure, that seemed promising but time alone could tell what the outcome would be.

Brinton handled the ground work activities and Bayles supervised all flying instruction. As an interesting point, Bayles would pick up a new

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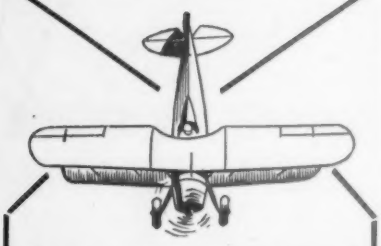

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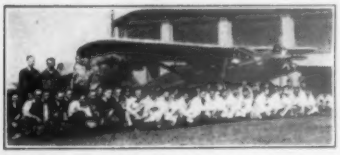

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In the fall of '28, Bayles decided to go to Detroit and take the examinations at the Ford School for trimotored pilots. He passed these with ease and then joined the Curtiss Flying Service staff at Boston, while still retaining his interest in the Eastern Company. With Curtiss, he learned to fly every type of ship and it was here that he really developed the knowledge already accumulated in past years. Eager — almost too eager — towards everything that came his way, he delved into all phases of aircraft activity.

Aviation was definitely the great ambition and love of his life, and he pursued it with all the enthusiasm at his command. They still tell stories at Curtiss about the sense of humor that made him a popular figure. Anything that could be turned into a popular joke was something for him to work on.

Beneath this sense of gaiety, however, he was a tireless worker who believed in, and practiced the ideals of, clean sportsmanship. He spent almost two years with Curtiss and then had to leave because of other demands upon his time and energy.

In 1930, he helped Brinton to organize the Brinton-Bayles Flying Service. This existed until midsummer of 1931, at which time he happened to become closely acquainted with the Granville Brothers, also of Springfield, Mass. One of their engineers, Robert L. Hall, had designed a small single-seater, fast sport plane which was to be entered in the All-American Derby.

The race, set as a 6,000 mile race around the United States, was organized by the American Sirrus Engine Manufacturing Company, with cash prize awards totalling $25,000.00 and open to all ships powered with their engine.

Bayles decided to enter the ship of Hall's design and, for ten days, the fleet of tiny racers dashed around the United States to complete the longest race in aviation history. Bayles turned up in second place, to win $7,500.00 and almost national recognition.

The attention this race drew to him, made him decide to turn to racing in earnest. He attended the National Air Races in Chicago a few weeks later, and here his daring stunt flying and speed won him further applause and fame.

IMMEDIATELY following the Chicago races, he and Brixton expanded their business and embarked on a barnstorming tour of stunting and passenger carrying throughout New England and the South. They managed to attend the Air Meets and Air Races all through the South and discovered that their venture was proving to be financially profitable, since Bayles would carry away the greater part of the important prizes.

It was during this latter period of barnstorming and racing that Hall, designer of the little craft that carried Bayles on the All-American Derby, developed the Gee Bee Super Sportster for the 1931 Cleveland Air Races. On his return to Massachusetts, Bayles and several of his friends, formed a corporation, called the Springfield Air Association, Inc., developed for the sole purpose of racing the little craft.

They called it "The City of Springfield" and Bayles practically lived with this ship during the following months. Following the Cleveland Races, however, Bayles and his associates decided to give the ship greater speed by means of an engine change and a different type of supercharger.

He came to Chicago, to appear in the Charity Air Show, and flew along the Lake Front where he attained a speed of more than 300 miles per hour. This classic event was viewed by more than 100,000 people and served to again bring his name before the general public. Yet, this did not completely satisfy Bayles; he desired the world's speed crown and was determined to have it officially. With that view in mind, he went to Detroit and there startled the nation with speed and daring.

On December 2nd of 1931 at the Wayne County Airport, Detroit, Bayles made four flights of 1.8 miles each and, by unofficial computation, hung up a new world's speed record of 284.7 miles per hour. Officially, he was later declared to have fallen short by 4.97 miles per hour. On December 4th, he came within one-half mile of accomplishing this task he held so close to his heart and, had darkness not fallen so rapidly, would have made another trial.

On the afternoon of December 5th he met the sad ending that fate had in store for him. Diving to the speed course, in the brilliant winter sun, the ship crashed to earth and took a life that had been, and would have been, of unestimable value to aviation. Perhaps his brilliant attempts to regain the speed crown for this country were not of as much value as the interest he stirred, and excited toward aviation in general.

Bayles, as those gone before, was a pioneer, helping to lay and smooth the road for those who were to follow. He is ranged—as he should be—with the greatest of our fliers, and the memory of a man who gave the best he knew to something that was more than a mere livelihood to him, will long hover over the field he aided with his achievements.

As a lasting memorial, a trophy is to be established, known as the Lowell R. Bayles Memorial Trophy, to be owned by the future holder of the American Speed Record until it is taken from him by another speed king. When that time comes—as it will—let us not forget this man who gave us so much.

END

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